研 究 論 文 抄 録

物 質 生 命 理 工 学 科

N. Kato, M. Kudo : "Quantum Molecular Dynamics Simulation for fragmentation of arginine molecule induced by ion impact", Appl. Surface Scie., 255, pp.905-907, 2008.9

邦文題目：イオン衝撃によって引き起こされるアルギニン分子のフラグメント化に対する量子分子動力学シミュレーション

15 keV Ga^+ ion impact and the thermal decomposition of arginine molecules has been simulated by quantum molecular dynamics (QMD). We obtained the calculated mass spectra which express the distribution for fragment molecule generated by ion impact or thermal decomposition. From the comparison between the experimental TOF-SIMS spectra and the calculated spectra, we discussed the fragmentation mechanism of arginine molecule by Ga^+ ion impact.

N. Kato, Y. Yamashita, S. Iida, N. Sanada, M. Kudo : "Analysis of TOF-SIMS spectra from fullerene compounds", Appl.Surface Scie., 255, pp.938-940, 2008.9

邦文題目：フラーレン化合物からのTOF－SIMSスペクトルの解析

We analyzed TOF-SIMS spectra obtained from three different size of fullerenes (C_{60}, C_{70} and C_{84}) by using Ga^+, Au^+ and Au_3^+ primary ion beams and investigated the fragmentation patterns, the enhancement of secondary ion yields and the restraint of fragmentation by using cluster primary ion beams compared with monoatomic primary ion beams. In the TOS-SIMS spectra from C_{70} and C_{84}, it was found that a fragment ion, identified as C_{60}^+ (m/z = 720), showed a relatively high intensity compared with that of other fragment ions related to C_2 depletion. It was also found that the Au_3^+ bombardment caused intensity enhancement of intact molecules (C_{60}^+, C_{70}^+ and C_{84}^+) and restrained the fragmentation due to C_2 depletion.

M. Kudo, K. Aimoto, Y. Sunagawa, N. Kato, S. Aoyagi, S. Iida, N. Sanada : "Comparison of Secondary Ion Intensity Enhancement from Polymers on Silicon and Silver Substrates by using Au-TOF-SIMS" Appl. Surface Scie., 255, pp.1015-1017, 2008.9

邦文題目：Au-TOF-SIMS法を用いてシリコンおよび銀基板上のポリマーから得られる二次イオン強度増強効果の比較

The usefulness of the usage of cluster primary ion source together with an Ag substrate and detection of Ag cationized molecular ions was studied from the standpoint to realize high sensitivity TOF-SIMS analysis of organic materials. Although secondary ions from polymer thin films on a Si substrate can be detected in a higher sensitivity with Au_3^+ cluster primary ion compared with Ga^+ ion bombardment, it was clearly observed that the secondary ion intensities from samples on an Ag substrate showed quite a different tendency from that on Si. When monoatomic primary ions, e.g., Au^+ and Ga^+, were used for the measurement of the sample on an Ag substrate, $[M^+Ag]^+$ ions (M corresponds to polyethylene glycol molecule) were detected in a high sensitivity. On the contrary, when Au_3^+ was used, no intensity enhancement of $[M^+Ag]^+$ ions was observed. The acceleration energy dependence of the detected secondary ions implies the different ionization mechanisms on the different substrates.

K. Okada, S. Aoyagi, M. Dohi, N. Kato, M. Kudo, M. Tozu, T. Miyayama, N. Sanada : "Evaluation of immobilized-lysozyme by means of TOF-SIMS", Appl.

Surface Scie., 255, pp.1104-1106, 2008.9
邦文題目：TOF－SIMSを用いた固定化リゾチウムの評価。

Evaluation of immobilized-proteins on bio-devices is important for the development of sophisticated devices. Lysozyme molecules immobilized on substrates were evaluated by means of time-of-flight secondary ion mass spectrometry (TOF-SIMS). Two types of the lysozyme- immobilized samples were prepared by controlling the binding parts, i.e., the amino groups or carboxyl groups, of the protein. The TOF-SIMS spectra of each sample were analyzed with mutual information to select fragment ions specific to each sample. According to the results, differences between the samples being immobilized in the different ways are suggested, and the surface structure of the lysozyme molecule immobilized at amino groups is determined based on three-dimensional structure of lysozyme in the Protein Data Bank.

Y. ODA, S. AIKAWA, S. KAWARASAKI, S. KATO, H. SUGANUMA, H. TANOUCHI and T. KOJIMA : "Selection of Tree Species for Afforestation of Salt-Affected Land", J. Ecotechnology, 14(4), pp.227-230, 2009.3
邦文題目：塩類化土壌への植林のための樹種選択

In this study, we identified the best tree species for the afforestation of salt-affected land. Although some planting trials have been carried out in the wheat belt of Western Australia, minimal detailed data on the mortality and growth rates of trees under salinity stress have been reported. Such data would facilitate the selection of species with sufficient salinity tolerance and high growth rates. In the present study, a cultivation experiment was conducted to clarify the salinity tolerance and growth rates of three Eucalyptus species widely planted in Western Australia. The experimental results were analyzed in terms of height growth, maximum photosynthetic rate, water use efficiency, and total biomass. The results suggest that the most suitable species for afforestation depends on the site environment because of the different salinity tolerance levels and growth rates of trees.

田原聖隆・堤　友哉・山崎章弘・里川重夫・小島紀徳：「大規模植林を想定した木質バイオマスの輸送用燃料化におけるインベントリ分析」日本エネルギー学会誌，88, pp.205-212，2009.3

The biomass energy production by intensive cultivation is expected in future. In this study, we assumed large-scale plantation in an arid land of Western Australia. We analyzed inventory about conversion processes to various fuels from produced wood. Our evaluation indexes are calorific yield as fuel (energy in produced fuel per one ton dry-wood), CO_2 emission (CO_2 emission from fuel production process per one ton dry-wood) and external energy consumption per one ton wood (primary energy basis). Calorific yield as fuel was also evaluated for the independent case where all input energy was assumed to be supplied from biomass itself or fuel from it.

From the results on energy consumption and CO_2 emission analyses with external energy input, transportation of wood or fuel was found to be negligibly small in case that the conversion process was located in Australia. But in case that conversion process was located in Japan, that was considerably high (15~40%). From the independent scenario (without energy input except that from biomass itself) analysis, in case of conversion process in Australia and transportation of produced fuel to Japan, 34% of the energy in the whole wood (at the maximum condition of 50% in the feedstock except felling loss) was at the maximum, expected to be recovered as energy in fuel for methanol production case. More than 30% (up to 55%) of the energy in the wood was exhausted in the conversion process. Energy based yield of fuel and CO_2 emission were much more influenced by the difference of target fuel or conversion process than the conditions of location and transportation.

N. Balasubramanian, T. Kojima, C. A. Basha, C. Srinivasakannan : "Removal of arsenic from aqueous

solution using electrocoagulation", Journal of Hazardous Materials 167 (2009), pp.966-969, 2009.1

邦文題目：電気凝固法を用いた水溶液からのヒ素の除去

Removal of arsenic from aqueous solution was carried out using electrocoagulation. Experiments were conducted using mild steel sacrificial anode covering wide range in operating conditions to assess the removal efficiency. The maximum arsenic removal efficiencywas recorded as 94% under optimum condition. The electrocoagulation mechanism of arsenic removal has been developed to understand the effect of applied charge and electrolyte pH on arsenic removal efficiency. Further the experimental data were tested with different adsorption isotherm model to describe the electrocoagulation process.

P. S. Vijayanand, S. Kato & S. Satokawa and T. Kojima : "Copolymerization of 4-cyanophenyl acrylate with methyl methacrylate: synthesis, characterization and determination of monomer reactivity ratios", J Polym Res (2009) 16:301-309, 2008.9

邦文題目：メチルメタクリル樹脂と4-シアノフェニルアクリレートとの共重合：合成，キャラクタリゼーションとモノマーの反応性比の決定

A novel acrylic monomer, 4-cyanophenyl acrylate (CPA) was synthesized by reacting 4-cyanophenol dissolved in methyl ethyl ketone with acryloyl chloride in the presence of triethylamine as a catalyst. Copolymers of CPA with methyl methacrylate (MMA) at different composition was prepared by free radical solution polymerization at 70+/-1 ^{o}C using benzoyl peroxide as an initiator. The copolymers were characterized by FT-IR, 1H-NMR and 13C-NMR spectroscopic techniques. The solubility tests were checked in various polar and non polar solvents. The molecular weight and polydispersity indices of the copolymers were estimated by using gel permeation chromatography. The glass transition temperature of the copolymers increases with increases MMA content. The thermal stability of the copolymer increases with increases in mole fraction of CPA content in the copolymer. The copolymer composition was determined by using 1H-NMR spectra. The monomer reactivity ratios determined by the application of linearization methods such Fineman-Ross (r1=0.535, r2=0. 0.632), Kelen-Tudos (r1=0.422, r2=0.665) and extended Kelen-T udos methods (r1=0.506, r2=0).

T. A. Gad-Allah, K. Fujimura, S. Kato, S. Satokawa, T. Kojima : "Preparation and characterization of magnetically separable photocatalyst ($TiO_2/SiO_2/Fe_3O_4$): Effect of carbon coating and calcination temperature", Journal of Hazardous Materials, 154, pp.572-577, 2008.6

邦文題目：磁気分離可能な$TiO_2/SiO_2/Fe_3O_4$光触媒の調製とキャラクタリゼーション：炭素被覆と焼成温度の影響

$TiO_2/SiO_2/Fe_3O_4$ composite was synthesized by sol-gel technique for silica and titania coatings on magnetite core to enable recovery after photocatalytic degradation. Carbon coating was also carried out by calcination of $TiO_2/SiO_2/Fe_3O_4$ under nitrogen atmosphere in presence of PVA as a source of carbon to enhance the adsorption of organic compounds on catalyst surface and to get better activity. All prepared samples were characterized using EDX, CN analyzer, XRD, BET and SEM. Degradation of methyl orange dye was used to assess the photocatalytic performance of the prepared samples. Calcination temperature was found to affect rate of reaction because of the formation of rutile phase at high calcination temperature. Carbon coated samples unexpectedly exhibited lower rate of reaction at almost all calcination temperatures.

P. S. Vijayanand, S. Kato, S. Satokawa and T. Kojima : "Homopolymer and copolymers of 4-cyanophenyl acrylate with glycidyl methacrylate: synthesis, characterization, thermal properties and determination of monomer reactivity ratios", Journal of Applied Polymer Science, 108, 3, pp. 1523-1530, 2008.5

邦文題目：グリシジルメタクリル樹脂と4-シアノフェニルアクリレートとのホモおよび共重合体：合成，キャラクタリゼーション，熱的物性と，モノマーの反応性比の決定

The acrylic monomer, 4-cyanophenyl acrylate

(CPA) was synthesized by reacting 4-cyanophenol dissolved in methyl ethyl ketone (MEK) with acryloyl chloride in the presence of triethylamine as a catalyst. The homopolymer and copolymers were synthesized by using free radical techniques. Characterization by FT-IR, 1H-NMR and 13C-NMR spectroscopic analysis confirms the chemical structure. The solubility of the polymers was tested in various polar and non-polar solvents. The polydispersity index values of polymers suggest a strong tendency for chain termination by disproportionation in all cases and the tendency increases with increasing GMA content in the feed. The initial decomposition temperatures for poly (GMA) (188°C), poly (CPA-co-GMA) (280°C) and poly(CPA)(290°C), reveals that the thermal stability of the copolymer increases with an increase in CPA content. DSC analysis showed Tg for poly(CPA)(25°C), poly (GMA) (74°C) and copolymer (0.4007: 0.5993) (39°C), indicates that Tg of the copolymers decreases with increases of CPA content. The copolymer composition was determined using 1H-NMR spectra. The monomer reactivity ratios were determined by the application of linearization methods such as Fineman-Ross (r1=0.5806, r2 =0.6651), Kelen-Tudos (r1=0.5442, r2= 0.6472) and extended Kelen-Tudos methods (r1=0.5372, r2=0.6352). The reactivity ratio values indicate that the co-polymerization has a tendency to alternation.

Dipu Boraha, S. Satokawa, S. Kato, T. Kojima : "Sorption of As(V) from aqueous solution using acid modified carbon black", Journal of Hazardous Materials, 162 (2009), pp.1269-1277, 2008.6

邦文題目：酸修飾したカーボンブラックによる水溶液中の5価ヒ素の吸着

The sorption performance of a modified carbon black was explored with respect to arsenic removal following batch equilibrium technique. Modification was accomplished by refluxing the commercial carbon black with an acid mixture comprisingHNO_3 orH_2SO_4. Modification resulted in the substantial changes to the inherent properties like surface chemistry and morphology of the commercial carbon black to explore its potential as sorbent. The suspension pH as well as the point of zero charge (pHpzc) of the material was found to be highly acidic. The material showed excellent sorption performance for the removal of arsenic from a synthetic aqueous solution. It removed 93% arsenic from a 50 mg/L solution at equilibration time. The modified carbon black is capable of removing arsenic in a relatively broad pH range of 3-6, invariably in the acidic region. Both pseudo-first-order and second-order kinetics were applied to search for the best fitted kinetic model to the sorption results. The sorption process is best described by the pseudo-second-order kinetic. It has also been found that intra-particle diffusion is the rate-controlling step for the initial phases of the reaction. Modelling of the equilibrium data with Freundlich and Langmuir isotherms revealed that the correlation coefficient is more satisfactory with the Langmuir model although Freundlich model predicted a good sorption process. The sorption performance has been found to be strongly dependent on the solution pH with a maximum display at pH of 5.0. The temperature has a positive effect on sorption increasing the extent of removal with temperature up to the optimum temperature. The sorption process has been found to be spontaneous and endothermic in nature, and proceeds with the increase in randomness at the solidsolution interface. The spent sorbent was desorbed with various acidic and basic extracting solutions with KOH demonstrating the best result (～85% desorption).

田熊保彦・福田加代子・川田幸平・加藤　茂・里川重夫・小島紀徳:「鉄粉を用いたフェントン反応によるトリクロロエチレンの分解反応速度」，化学工学論文集34(2)，pp.309-312，2008.4

本研究では鉄粉と過酸化水素を用いたフェントン反応によるTCEの分解反応の反応速度を測定した。その結果，鉄粉を用いたときにはFe(II)を用いた場合と異なり，TCE分解速度は分解初期の導入期を経た後，分解が進むことがわかった。導入期を除くと，反応はTCE濃度に対して1次として解析できた。得

られた反応速度定数は，鉄粉濃度に対して1次反応であることがわかった。過酸化水素濃度に対しての反応次数は過酸化水素濃度範囲によって変化することがわかった。また，高濃度の過酸化水素を用いた場合，TCE分解反応の過酸化水素濃度に対する反応次数は負になることがわかった。

小島紀徳・舘　健悟・境　純一・加藤　茂・里川重夫:「テトラメトキシシランの加水分解による微粉シリカ合成に及ぼす装置形状とガス混合の影響」化学工学論文集, 34(2), pp.261-265, 2008.4

高純度微粉シリカは半導体産業などで広く使われている。著者らは，前報でテトラメトキシシラン(TEMS)の気相加水分解でシリカの微粉生成が可能であることを示した。本論文では，装置形状，粒子性状特に粒径に与える影響について調べた結果を報告する。Type1-3の3種類の形状の異なる反応器を用いた。Type1は前報で用いられたものであり, TEMSは水蒸気とともに反応器上部より同方向に流入し，加熱されながら反応する。一方, Type2および3では，TEMSは装置下方より流入，加熱された水蒸気と混合される。Type3ではType2に比べ水の導入管は短く，混合部温度はより高温である。平均粒子径はType1, 2, 3の順に小さくなった。この結果から，水蒸気共存下でTEMSを急速に加熱することによってより小さい微粉粒子が生成することが示された。この条件下では異相反応による粒子成長が抑えられ，核生成反応のみが加速されたものと考えられる。このように反応器形状を変えることでガス混合条件を変え，ひいては水蒸気共存下でのTEMSの加熱条件が変わり，生成シリカ粒子の平均粒径が変わったものと考えられる。

飯塚京子・石川　正・栗原良将・黒田正明・近　　匡・神保雅人・藤本順平 ：「GRACE/SUSY-loopを用いたsfermion崩壊幅の1ループ補正の計算」，日本物理学会2008年秋季大会講演概要集, 22pSM-8 2008.9

GRACE/SUSY-loopを用いてMSSMにおける1ループ補正を含んだsfermionの2体崩壊幅の計算を系統的に行った。この中でstop1-> b chargino1 の過程を例にあげると，標準的なSPA1a’パラメータセットに対して，電弱補正（86ファインマン図）が10.5%，QCD補正（6ファインマン図）が－7.1%，tree計算からの補正が必要であることがわかった。このように, 電弱補正の方がQCD補正より大きい場合もある。したがって，sfermionの崩壊過程について全て電弱補正の計算が必要である。

飯塚京子・石川　正・栗原良将・黒田正明・近　　匡・神保雅人・藤本順平 ：「GRACE/SUSY-loopを用いたgluino崩壊幅の1ループ補正の計算」，日本物理学会2009年春第64回年次大会講演概要集, 28aSB-10 2009.3

gluinoはLHC実験で発見が期待されている超対称性粒子の一つであり，その崩壊モードを正確に予測することは重要である。ここでは自動計算プログラムGRACE/SUSY-loopを用いて，MSSMにおけるsquarkより重いgluinoの2体崩壊幅の1ループ補正計算を行った。すなわちのQCD補正および電弱補正のSusyパラメータ依存性を調べた。例えばSPS1a’パラメータセットにおける電弱補正値として δΓ(u su1)=4.0%等の結果が得られた。また同じ質量のgluinoがtop quarkと重い方のstop（st2）にも崩壊できるパラメータでは，δΓ(t st2)=12.0%等の値が得られた。

M. Ishikawa, R. Harada, N. Sasaki, and K. Miura : “Visualization of nanoscale peeling of carbon nanotube on graphite”, Applied Physics Letters, Vol.93, pp.0831221-0831222, 2008.8

邦文題目：グラファイト上のカーボンナノチューブのナノスケール引き剥がしの可視化

This is one of the nanomechanical studies of our group. We have fabricated a manipulation system with a force detection, which uses a self-detective cantilever, in a chamber of a scanning electron microscope. This system can simultaneously manipulate a nanoparticle and detect a force needed to move it, a detective resolution of which is approximately 1 nN. In this work, nanoscale peeling processes of a multiwalled carbon nanotube (MWCNT) on the graphite substrate have been studied. We have first experimentally obtained the vertical force-distance curve with the characteristic hystereis loop which exhibits the multistable states between line contact and point contact of the MWCNT shape during the peeling processes.

石川　誠・原田竜一・佐々木成朗・三浦浩治 ：「力検出機構を備えたマニュピレーションSEM」，表面科学

Vol.29, pp.713-715, 2008.11

We have fabricated a manipulation system with a force detection, which uses a self-detective cantilever, in a chamber of a scanning electron microscope. This system can simultaneously manipulate a nanoparticle and detect a force needed to move it, a detective resolution of whichis approximately 1 nN. In this work, nanoscale peeling processes of a multiwalled carbon nanotube (MWCNT) on the graphite substrate have been studied.

N. Sasaki, H. Saitoh, N. Itamura, K. Miura : "Analysis of Lateral Orientation of Single-Walled Carbon Nanotube on Graphite", e-J. Surf. Sci. Nanotechnol. 7, pp.48-52, 2009.1

邦文題目：グラファイト上の単層カーボンナノチューブの水平配向の解析

We investigate the stable lateral orientation of the single-walled carbon nanotube (SW-CNT) physically adsorbed onto the graphite substrate surface using molecular mechanics simulation. The system of the (3,3) armchair-type SW-CNT comprised of 198 carbon atoms with alength of 40.3 A interacting with the rigid graphene sheet is considered. Effect of the initial lateral orientation on the final lateral orientation is discussed. The stability of the initial and the final stable orientations can be explained by analyzing the interaction energy between the SW-CNT and the substrate, as a function of the rotational angle θ and the center position rc = (xc; yc) of the SW-CNT, within the lateral (0001) plane of the graphite substrate. Molecular mechanics simulations for the perfect substrate surface under the condition T =0 give the final stable minima near the initial states, instead of the atomic-scale locking around the global minima.

N. Sasaki, H. Saitoh, K. Terada, N. Itamura, K. Miura : "Simulation of Atomic-Scale Wear of Graphite - Nanotip Induced Graphene Formation", e-J. Surf. Sci. Nanotechnol. 7, pp.173-180, 2009.3

邦文題目：グラファイトの原子スケール摩耗のシミュレーション - ナノ探針が誘起するグラフェン形成

The atomic-scale wear, the formation process of the graphene during the lateral line scan process of the nanoscale tip on the multi-layered graphene substrate is studied by using molecular relaxation method. The nanotip is scanned in line forward (along [1230] direction) and backward under the constant-height mode. Analysis of the effect of the tip height on the relative motion of the nanotip, the 1st graphene layer, and the 2nd graphene layer, reveals the transition from the nanotip state to the graphene tip state. During the nanotip state the mean lateral force <Fx> rapidly increases as the mean loading force <Fz> increases. Here the friction between the tip and the surface occurs. However, during the grapheme tip state, <Fx> takes nearly the constant value independent of <Fz>. Here the internal friction among the 1st, the 2nd and the 3rd grapheme layers occurs. The marked scan directional dependence and the increase of <Fx> near the graphene edge appears. The irreversible shift of the graphene layer after all the scan processes can explain the mechanism of the elementary process of the atomic-scale wear.

N. Itamura, K. Miura, N. Sasaki : "Analysis of Mechanism of Low Lateral Stiffness of Superlubric C60 Bearing System", Jpn. J. of Appl. Phys. 48, pp.0302141-0302143, 2009.3

邦文題目：超潤滑C60ベアリングシステムの微小水平硬さのメカニズムの解析

The mechanism of the low lateral stiffness of the superlubric C60 bearing system along the [1010] direction, k_C60 , is studied and compared with that of the graphite system by static molecular mechanics simulation. It is clarified that the C60 rotation and the elastic contact at the C60/graphite interface contribute to a decrease in k_C60. Under low and high loading conditions, the elastic contact and C60-rotation plays a major role for the low k_C60 , respectively. Particularly effect of the C60-rotation on the decrease of k_C60 becomes markedly enhanced as the loading force increases.

P. Chutia, S. Kato, T. Kojima, S. Satokawa : "Synthesis and characterization of Co(II) and Cu(II) supported complexes of 2-pyrazinecarboxylic acid for cyclohexene oxidation", Polyhedron, 28, pp. 370-380, 2009.2

邦文題目：担持Co(Ⅱ), Cu(Ⅱ)ピラジンカルボン酸錯体触媒の合成とシクロヘキセン酸化

The complexes [Co(N^O)$_2$] and [Cu(N^O)$_2$] {N^O = η^2-(N,O) coordinated 2-pyrazinecarboxylic acid} have been synthesized and characterized by elemental (including metal) analyses, FT-IR spectroscopy and powder X-ray diffraction. The catalytic activities of all the catalysts towards the oxidation of cyclohexene into different chemically and pharmaceutically important products were evaluated under homogeneous and heterogeneous conditions. In order to obtain a maximum conversion of cyclohexene, the reaction parameters, like reaction temperature and time, were optimized. Under the optimized conditions, a maximum of 90.47% cyclohexene conversion was achieved with [Cu(N^O)$_2$]–Y with a 1:2 molar ratio reaction of cyclohexene and H_2O_2.

P. Chutia, S. Kato, T. Kojima, S. Satokawa : "Arsenic adsorption from aqueous solution on synthetic zeolites", J. Hazardous mater., 162, pp. 440-447, 2009.2

邦文題目：合成ゼオライトを用いた水中のヒ素除去

The adsorption of arsenic from aqueous solution on synthetic zeolites H-MFI-24 and H-MFI-90 with MFI topology has been investigated at room temperature applying batch equilibrium techniques. The influences of different sorption parameters such as contact time, solution pH, initial arsenic concentration and temperature were also studied thoroughly in order to optimize the reaction conditions. Adsorption performance of H-MFI-90 is higher compared to H-MFI-24 due to it's highly mesoporous nature which in turn accelerates the diffusion process during adsorption. Ion exchange between adsorbent's terminal aluminol groups with different predominant forms of arsenate in solution is one of the various important reactions occurred during adsorption process.

P. Chutia, S. Kato, T. Kojima, S. Satokawa : "Adsorption of As(V) on surfactant modified natural zeolite", J. Hazardous mater., 162, pp. 204-211, 2009.2

邦文題目：界面活性剤処理した天然ゼオライトによるヒ素（Ⅴ）の吸着

Natural mordenite (NM), natural clinoptilolite (NC), HDTMA-modified natural mordenite (SMNM) and HDTMA-modified natural clinoptilolite (SMNC) have been proposed for the removal of As(V) from aqueous solution (HDTMA= hexadecyltrimethylammonium bromide). Pseudo-first-order model was applied to evaluate the As(V) sorption kinetics on SMNM and SMNC within the reaction time of 0.5 h. The pseudo-first-order rate constants k were 1.06 and 0.52 h^{-1} for 1 and 0.5 g of SMNM, respectively. The observed k values, 1.28 and 0.70 h^{-1} for 1 and 0.5 g of SMNC, respectively. were slightly higher tham those of SMNM. Surfactant surface coverage plays an important role and a significant increase in arsenate sorption capacity.

F. H. Margha, S. A. M. Abdel-Hameed, N. A. E. Ghonim, S. Satokawa, T. Kojima : "Crystallization behavior of new transparent glass-ceramics based on barium borate glasses", J. Ceram. Soc. Jpn., 116, pp. 624-631, 2008.5

邦文題目：新規酸化バリウム酸化ホウ素系透明ガラスセラミックスの結晶化挙動

This paper comprises the preparation of some new transparent and very fine crystals glass-ceramics from the BaO-B_2O_3 system by adding appropriate additive of fluorides, partial replacement of B_2O_3 by SiO_2 and introducing nucleating agents such as TiO_2. Physical properties of the prepared materials and their changes with varying the base glass composition or the heat treatment program were investigated. The dielectric constant of transparent glass-ceramics samples at 100 kHz were between 14-20, which is very suitable to many applications such as the high-speed switching of large-scale integrators.

K. Kunisawa, K. Urasaki, Y. Otsu, S. Kato, T. Kojima, S. Satokawa, “Decomposition of tristearin by ozonolysis over heterogeneous catalyst under moderate condition”, J. Jpn. Petrol. Inst. 51, pp.186-189, 2008.5

邦文題目：固体触媒上でのトリステアリンのオゾンによる分解

Ozonolysis of triacylglycerol was carried out over heterogeneous catalysts. The triacylglycerol was decomposed to some compounds with low boiling points containing hydrocarbons, aldehydes, ketones, fatty acids and lactones over H-Y zeolite catalyst at 353-423 K. The amounts of products were strongly dependent on the properties of catalysts and reaction conditions.

K. Yonekura, L. Jin and K. Takizawa : “Measurement of dispersion of effective electro-optic coefficients r_{13}^E and r_{33}^E of non-doped congruent $LiNbO_3$ crystal”, Jpn. J. Appl. Phys., Vol. 48 No.7, pp.5503-5508 ,2008.7

邦文題目:ノンドープコングルエント$LiNbO_3$結晶の実効的電気光学係数r_{13}^E および r_{33}^Eの波長分散特性の測定

Effective electro-optic (EO) coefficients r_{13}^E and r_{33}^E in the wavelength range 409-3390 nm were measured for non-doped congruent $LiNbO_3$ crystal under constant stress by using the multiple reflection interference method. Wavelength dispersion equations were obtained based on the experimental data. Since the effective EO coefficients are related to the change of the refractive index due to the EO effect and the change of the crystal length due to the inverse piezoelectric effect in the crystal under the constant stress, it is very important parameters for designing optical devices working in the low-frequency region.

K. Takizawa, L. Jin, Y. Yoshida and K. Yonekura : “Performance of a television camera system for the detection of oil slicks”, Op. Eng. ,Vol.47, No.9, pp. 093801-1—093801-8, 2008.9

邦文題目：油膜検出用テレビカメラの性能

We performed some laboratory experiments to evaluate a television camera system for sensing oil slicks. This system captures the marked differences in intensity of sunlight reflected from the surface of the sea and from the slick. We also proposed a novel method to compensate for the wavelength dependence of sunlight and the quantum efficiency of the CCD arrays, which has been ignored up to now. During laboratory experiments, a glass plate coated with an Al_2O_3 film has been employed instead of a real slick. The experimental results showed that detection probability depends on the sample thickness, and greatly on the angle of incidence.

Toshiaki Tsukuda, Chikamine Nishigataa, Kodai Araia and Taro Tsubomura : “Photophysical properties of copper(I) and zinc(II) complexes containing phosphinoquinoline ligands”, Polyhedron, vol.28, No.1, pp.7-12, 2009.1

邦文題目：ホスフィノキノリン配位子を含む銅(I)と亜鉛（II）錯体の光物理特性

Several copper(I) and zinc(II) complexes with 8-(diphenylphosphino)quinoline (PPh_2qn) or 8-diphenylphosphinoquinaldine (PPh_2qna) have been prepared. These ligands contain both imine and phosphine moieties, which can act as coordinating groups. X-ray analysis of the Cu(I) complexes reveals that $[Cu(PPh_2qn)_2]PF_6$ (**Cu-1**) and $[Cu(PPh_2qn)_2]PF_6$ (**Cu-2**), coordinated by two PPh_2qn and PPh_2qna ligands respectively, are obtained. In the Zn(II) complexes, a structural study shows that $[ZnCl_2(PPh_2qn)]$ (**Zn-1**), $[ZnBr_2(PPh_2qn)]$ (**Zn-2**) and $[ZnI_2(PPh_2qn)]$ (**Zn-3**) are coordinated by one PPh_2qn ligand and two of the corresponding halogeno ligands (Cl^-, Br^- and I^-). In the solid state **Cu-1** and **Cu-2** show luminescence which is assigned to a ^{3}MLCT transition involving π* of the quinoline group, as shown in the $[Cu(dmp)(diphosphine)]^+$ complexes; due to the reduced bulkiness of the coordination sphere around the copper atom, no emission is observed in solution. **Zn-1** shows a similar emission band to that of free PPh_2qn at both room temperature and 77 K. It suggests the emission bands should be assigned to a ligand-centered (LC) transition. In the solid state, it is found that the emissive energy of the complexes shift to lower energy and the energy depends on the halogeno ligands in the zinc complexes.

坪村太郎・ 佃　俊明・ 松本健司：「発光性 d10遷移金属錯体」, Bulletin of Japan Society of Coordination Chemistry, vol.52, pp.29-42, 2008.11

The study in the area of luminescent d^{10} complexes has been developing rapidly. The metals with d^{10} electronic configuration have a closed d-shell, therefore the nature of the complexes are quite different from regular transition metal complexes. The complexes show a diversity of the electronic excited states. This paper reviews the characteristic nature of the d^{10} metal complexes with interesting examples. Copper(I), silver(I), gold(I), nickel(0), palladium(0) and platinum(0) complexes are discussed. Luminescent copper(I) complexes are classified into two groups; the first includes the complexes bearing halogen ligands, and the second have no halogen ligands. In the second group, the complexes with phosphine and diimine type ligands are mainly discussed. As for the silver(I) and gold(I) complexes, multinuclear complexes are mostly described. For the palladium(0) and platinum(0) complexes, although a small number of works have been published so far, some interesting studies including our works have been described. In addition to the recent studies on the photophysical properties of the complexes, some applications are described in this review.

T. Suzuki, I. Matsuo, K. Totani, S. Funayama, J. Seino, N. Taniguchi, Y. Ito, S. Hase：“Dual-gradient HPLC for identification of cytosolic high mannose-type free glycan”, Analytical Biochemistry Vol.381, No.2, pp.224-232, 2008. 10

邦文題目：デュアルグラディエントHPLCによる細胞質遊離糖鎖の同定

It has been shown that free oligosaccharides derived from N-linked glycans accumulate in the cytosol of animal cells. Most of the glycans have only a single GlcNAc at their reducing termini (Gn1 glycans), whereas the original *N*-glycans retain *N,N*-diacetylchitobiose at their reducing termini (Gn2 glycans). Under the conditions of high-performance liquid chromatography (HPLC) mapping established for pyridylamine (PA)- labeled Gn2 *N*-glycans, Gn1 glycans are not well retained on reversed-phase HPLC, making simultaneous analysis of Gn1 and Gn2 glycans problematic. We introduced a dual gradient (i.e., pH and butanol gradient) for the separation of Gn1 and Gn2 glycans in a single reversed-phase HPLC. Determination of elution time for various standard Gn2 high-mannose-type glycans, as well as Gn1 glycans found in the cytosol of animal cells, showed that elution of Gn1 and Gn2 glycans could be separated. Sufficient separation for most of the structural isomers could be achieved for Gn1 and Gn2 glycans. This HPLC, therefore, is a powerful method for identification of the structures of PA-labeled glycans, especially Gn1-type glycans, isolated from the cytosol of animal cells.

情　報　科　学　科

池上敦子，森田隼史，山口拓真，菊地　丞，中山利宏，大倉元宏：「鉄道運賃計算のための最安運賃経路探索・複数の鉄道会社を含む場合 -」, 日本オペレーションズ・リサーチ学会和文論文誌, Vol.51, pp.1-24, 2008.12

本研究では，運賃設定の異なる複数の鉄道会社を含む鉄道ネットワーク上の運賃計算を正確かつ高速に行えるネットワーク表現とアルゴリズムについて報告する。鉄道運賃は，利用者の乗車経路が明らかであるとき，多くの場合，その経路に含まれる各鉄道会社が定めた運賃を足し合わせることによって得られる。一方, 利用者の乗車経路が明確でない場合，利用可能経路の中で最も安い経路を利用したとみなし，その運賃を採用することが一般的である。しかし，鉄道運賃は，基本的には「距離が長くなればなるほど高く」なるように設定されているものの，同じ距離でも，会社によって異なる料金が設定されていることや，乗車区間によって割引ルールや特別運賃が設定されていることなどから，物理的距離に基づくショーテストパスが最も安い経路になるわけではない。よって，与えられた2駅間の正しい運賃を計算するためには，その2駅間の可能経路の運賃をすべて，もしくは，その1部を列挙して比較判断す

る必要があることがこれまでにも報告されてきた。本研究では，物理的構造に基づくネットワーク上での経路探索を行う代わりに，ダイクストラ法が利用可能な運賃計算用ネットワークを構築し，ダイクストラ法と，少ないケースではあるがK-shortest paths 問題用のアルゴリズムを利用することにより，複数社を含む鉄道ネットワーク運賃計算の大幅な高速化に成功した。

山口拓真，菊地　丞，森田隼史，中山利宏，川上喜久，池上敦子：「IC時代の高速で柔軟な運賃計算エンジン」，第45回鉄道サイバネ・シンポジウム論文集，pp.1-5，2008.11

本論文では，IC時代に必要とされる高速で柔軟な運賃計算エンジンと，これを用いた運賃計算への信頼性に対する取り組みについて述べる。2001年に首都圏においてSuicaが導入されてから非接触型ICカードの利便性が認識され，乗車券のICカード化が全国に広がっている。また，他社路線との相互運用も拡大傾向にあり，すでに複雑な首都圏の鉄道網がさらに複雑になることが想定される。本稿では，複雑化している運賃計算に対して著者らが提案してきた最安運賃経路探索の手法を紹介し，これをベースとした運賃計算エンジンの実用化における課題とその解決方法について述べる。そして，信頼性の維持・向上に対する取り組みとして，複数の異なる運賃計算エンジンを並列稼動し，Fault Tolerant技術のひとつであるn-version programming を取り入れたことについて述べる。

Abe, T. and Iwasaki, M.: " Evaluation of statistical methods for analysis of small-sample longitudinal clinical trials with dropouts", *Journal of the Japanese Society of Computational Statistics*, Vol. 20, No. 1, pp. 1-18. 2008.6

邦文題目：脱落を伴う小標本の経時測定臨床試験データの統計解析法の評価

In longitudinal clinical trials missing data occur mainly because of dropouts. Such incomplete data are often analyzed by using completer analysis and/or LOCF (Last Observation Carried Forward). In this paper, we evaluate the performance of four imputation methods for the multiple imputations contrasted with completer analysis and LOCF via Monte-Carlo simulations. The performance of the methods with non-normal data (i.e. mixture of responders and non-responders) is also examined.

平野哲夫・岩崎　学：「乳酸デヒロゲナーゼ（LD）活性測定の至適条件のResponse Surface Methodology (RSM) の応用の試み」，臨床化学，Vol. 37，No. 3，pp. 292-299．2008.7

乳酸デヒロゲナーゼ（LD）活性測定の至適条件の探索では，これまでいくつかの手法が提案されてきたが，どれもその適用には専門的な技術を必要とし，簡便なものとは言い難かった。ここでは，実験計画法における統計手法の一つである応答曲面法(RSM) を用いることにより比較的容易に至適条件を探索する方法を紹介し，実際のデータに当てはめた結果を示した。

平野哲夫･岩崎　学:「Excelによる応答曲面法（RSM）の解析（II)」, 臨床化学, Vol. 37, No. 3, pp. 308-316. 2008.7

実験計画法の一手法である応答曲面法（RSM）をMicrosoft Excelの分析ツールを用いて簡単に扱える方法を紹介した。乳酸脱水素酵素（LD）活性測定勧告法［乳酸（L）→ピルビン酸（P）反応］における乳酸およびNAD＋濃度の至適条件実験結果を例にとりRSMの適用を試みた。また，回帰モデル適合検定の指標として, PRESS残差, studentized残差, R-student，Cp統計量およびCookの標準距離などを取り上げた。

Kawata, Y. and Iwasaki, M. : "Assessment of non-normality in pretest-posttest research under screening of the pretest score", *Journal of the Japanese Society of Computational Statistics*, Vol. 21, No. 1, pp. 31-44. 2009.1

邦文題目：処置前値にスクリーニングがある場合の処置前後研究における非正規性の評価

In pretest-posttest designs, screening is often performed on the baseline values to determine whether or not subjects are enrolled to the study. Even if the pretest and posttest scores jointly follow a bivariate normal distribution, the screening on pretest score surely depart from the normality assumption. This paper examines the extent of non-normality caused by screening on the pretest scores. Under a bivariate normal distribution for

pretest and posttest scores, departures from normality are assessed in terms of the Kullback-Leibler divergence, skewness and kurtosis of distributions for some several types of screening schemes.

S.Okamoto, M. Kamada, and T. Yonekura：“Prototyping Tool for Web-based Multiuser Online Role-Playing Game”, IEICE Transactions on Information and Systems, Special Section on Human Communication III, Vol.E91-D, No.6, pp.1700 - 1703, 2008.6

This letter proposes a prototyping tool for Web-based Multiuser Online Role-Playing Game (MORPG). The design goal is to make this tool simple and powerful. The tool is comprised of a GUI editor, a translator and a runtime environment. The GUI editor is used to edit state-transition diagrams, each of which defines the behavior of the fictional characters. The state-transition diagrams are translated into C program codes, which plays the role of a game engine in RPG system. The runtime environment includes PHP, JavaScript with Ajax and HTML. So the prototype system can be played on the usual Web browser, such as Firefox, Safari and IE. On a click or key press by a player, the Web browser sends it to the Web server to refrect its consequence on the screens which other players are looking at. Prospected users of this tool include programming novices and schoolchildren. The knowledge or skill of any specific programming languages is not required to create state-transition diagrams. Its structure is not only suitable for the definition of a character behavior but also intuitive to help novices understand. Therefore, the users can easily create Web-based MORPG system with the tool.

竹原陽道・岡本秀輔・鎌田　賢・米倉達広:「階層構造をもつ状態遷移図に基づくロボット制御プログラミング環境の提案」,電子情報通信学会和文論文誌Dサイバーワールド特集号,Vol.J91-D, No.12, pp.2857 - 2860, 2008.12

状態遷移図を階層的に指定することにより，ロボットの動作制御を可能とするプログラミング環境を提案する。この環境でのプログラミングは，ビジュアルプログラミングとなるため，テキストベースのプログラミングを知らない子供でも使用でき，ロボットを自分の思うように動かしたい人すべてが対象ユーザとなる。試作環境は,レゴ社の Mindstorms NXT を対象としている。本論文では，単純な例によるロボットプログラムの記述力について示し，実際のロボットコードへの変換例を示すことで，提案環境の有用性について述べる。

小花聖輝，岡本秀輔，鎌田　賢，米倉達広:「MORPGにおけるサーバ負荷分散手法の検討」，電子情報通信学会2種研究会　サイバーワールド(CW)第11回研究会，pp.7-11,2008.12

Web ベースの複数プレイヤ参加型オンラインRPGにおけるサーバの負荷分散の手法について提案する。本提案は，複数台のサーバによる負荷分散と。ユーザビリティの向上を目標としている。ブロードバンドインターネット接続環境の一般的な普及やJavaScriptの高速化,Ajax 通信技術などによりWebベースのアプリケーションはその数を増やしている。しかし，MORPG においては，サーバに対するアクセス集中と高い通信頻度によるユーザビリティの低下が問題となる。本提案では，複数台のサーバに対し，分割したゲーム領域を割り当てるホームの考えと，動的なホームの移動を導入したシステムを実装し動作の確認を行った。

遠藤久慶・岡崎康広・岩田知洋・関戸響子・櫻井　勝・小口喜美夫：「モーションキャ プチャを使用した胸骨圧迫法の検討」,日本臨床救急医学会雑誌　別冊　日臨救急医会誌，Vol.12，No.1，pp.8-16，2009.1

もし急に人が倒れてもすぐに救急車が到着するとは限らないため，救命の際，効果的な胸骨圧迫とAEDによる除細動が最も重要な処置となる。特に胸骨圧迫は特別な器具を必要とせず，心停止時に血中酸素分圧が維持されている症例では極めて重要である。また，場合によっては，バイスタンダは長時間の胸骨圧迫を行わなければならず，そのためには効率的な胸骨圧迫が必要とされる。

本論文では，熟練者が行う胸骨圧迫は効率的であることを明らかにし，その上で胸骨圧迫時の効率的動作と非効率的動作の相違点について検討し，効率的な圧迫動作に対する重要点（ポイント）を抽出した。このポイントを非熟練者に指導することにより

効果的でかつ効率的な胸骨圧迫を習得させることができるかを試みた。

胸骨圧迫法に熟練した被験者（救急救命士6名）と経験の浅い被験者（6名）に心肺蘇生練習用人形に対する胸骨圧迫を実施させ，モーションキャプチャなどの各種機器を用い連続した胸骨圧迫中の肘の角度，筋活動量，圧迫の深さ，圧迫の回数の変動について測定した。

その結果，熟練者は非熟練者に対し，明らかに効率的な胸骨圧迫を行っていた。その動作のポイントが「肘の角度の固定」にあると考えられた。非熟練者に対し肘を「まっすぐ伸ばすよう」に口頭で修正指導することにより，容易に熟練者と同等の胸骨圧迫に改善され，余計な筋肉を使うことなく，効果的でまた効率的な胸骨圧迫を実施させることが可能となった。

河野義広，宮田昌廣，塙　　大，米倉達広，「Dead Reckoningを用いたリアルタイムWebゲームの設計と評価」，電子情報通信学会論文誌D分冊，Vol.91-D，No.12, pp.2833-2843, 2008.12

近年，インターネット上で動作するオンラインゲームの市場が急速に普及してきている。特に，アクションゲームやスポーツゲームなどのように高いリアルタイム性が要求されるアプリケーションにおいては，通信遅延，通信帯域の問題が顕著である。本論文では，現在広く普及しているWeb上のAjaxシステムに着目し，ユーザがWebブラウザを通して簡単に利用できるリアルタイムWebゲームの実現可能性を考察する。筆者らは既にこの種の分散仮想環境の要素技術として，独自のDead Reckoning (DR)手法を提案している。そこで，リアルタイムWebゲームにおけるHTTP通信の制限を克服するため，DRを導入しその実現性を評価した。その結果，提案手法は様々な種類のリアルタイムWebアプリケーションに適用可能であることが確認された。

S. Terada, Y. Kakishima, D. Hanawa, and K. Oguchi：“Physical Configuration of the Next Generation Home Network”, IEICE Trans. Communications, Vol. E91-B, No.7, pp.2169-2177, 2008.7

邦文題目 ：次世代ホームネットワークにおける物理網構成

The number of broadband users is rapidly increasing worldwide. Japan already has over 10 million FTTH users. Another trend is the rapid digitalization of home electrical equipment e.g. digital cameras and hard disc recorders. These trends will encourage the emergence of the next generation home network. In this paper, we introduce the next generation home network image and describe the five domains into which home devices can be classified. We then clarify the optimum medium with which to configure the network given the requirements imposed by the home environment. Wiring cable lengths for three network topologies are calculated. The results gained from the next generation home network implemented on the first phase testbed are shown. Finally, our conclusions are given.

色川恵理・石岡秀基・甲斐宗徳：「タスクスケジューリングのためのGUIツールの開発」, 成蹊大学理工学研究報告, Vol.45, No.1, pp.5-12, 2008.6

マルチプロセッサシステムでタスク集合を適切に負荷分散し処理の高速化を実現するためには，プログラムから効率的に並列実行可能な粒度のタスクを抽出し，それらのタスクをプロセッサに適切に割り当てるスケジューリング手法が重要なキーポイントになる。このタスクスケジューリング問題は強NP困難なクラスに属す組み合わせ最適化問題であり，大規模タスクグラフにおいて全探索に基づくアルゴリズムのみで最適解を求めることは事実上困難である。そのため適切なヒューリスティックを導入して，実用的な時間内で最適または近似解を求めるスケジューリング手法を構築する必要があり，このスケジューリング手法の良し悪しが並列処理の効率を左右する一因となる。このアルゴリズムの構築にはタスクグラフの形状や暫定解の見直しによるヒューリスティックの反復的考察が不可欠である。従来はタスクグラフやガントチャートを人手で作成して考察していたが，多数のタスク集合を材料にしてスケジューリングアルゴリズムを練り上げるため，大いに手間と時間がかかる状況にあった。そこで本論文では，スケジューリングアルゴリズムや必要なヒューリスティックを考察する手助けとするためにタスクグラフとガントチャートを自動で表示し，暫定解の見直しに伴う部分スケジューリングや再スケジューリング機能によってアルゴリズム自体の改善に役立つ情報を適用するGUIツールの提案を行う。

小山浩生・緑川博子・甲斐宗徳：「マルチコアクラスタ向け並列言語　－スレッド/プロセス並列機構の実装－」，成蹊大学理工学研究報告，Vol.45，No.1，pp.13-20，2008.6

筆者らは，ソフトウェアDSM(Distributed Shared Memory)の研究開発をもとに，ローカリティに着目したメタプロセスモデルという階層型共有メモリプログラミングモデルを提案し，これに基づくポータブルなAPIとしてMpC言語を開発してきた。すでに，コモディティクラスタや共有メモリ型SMPマシンにおいてUPCやOpenMPと比較し，MpCに性能上の優位性があることを示した。さらに，NPB(NAS Parallel Benchmark)ベンチマークセットをMpCと他の言語で記述したプログラムの有効行数の比較では，逐次コードに対し，MPIが平均1.74倍に増大するのに比べ，MpCは平均1.07倍にとどまっており，プログラムの可読性，生産性の上で優れていることを明らかにしている。本論文では，このMpC言語への追加機能および性能向上として『共有メモリマシン向けコンパイラの生成コードの最適化』，『クラスタ向けコンパイラへのスレッド機構の導入』を行い，また，MpCコンパイラの応用として『逐次大容量データ処理向けDLMコンパイラの構築』を行ったので報告する。

櫻井康樹・加藤史彬・津田達也・甲斐宗徳：「強マイグレーションモバイルエージェントのためのソースコード変換器の実装」，成蹊大学理工学研究報告，Vol.45，No.1，pp.21-30，2008.6

並列分散処理システムでは多くのユーザが様々なアプリケーションの処理を要求するため，それらの投入による負荷の変動に合わせて，その後のアプリケーションの分散の仕方を適切に変えていかなければ，高性能でかつ信頼性の高い並列分散処理は実現できない。その対応を個々のユーザがプログラムに組み込むのは決して容易ではない。そこでシステム自身に自律性を持たせることで，ユーザのアプリケーションを実際に自律的に振る舞わせる可能となる。筆者らは，これまでに自律性を実現するためのモバイルエージェントシステムを設計してきた。それは多くのJavaベースのモバイルエージェントシステムと同様に，弱マイグレーションのモビリティを利用しているため，移動先で移動前の処理を継続するエージェントを自由に記述することは困難であった。高い自律性を実現するには，採用するモビリティは強マイグレーションであることが望ましい。そこで，ユーザが記述するためには単純な強マイグレーション命令を用意し，通常のJava仮想マシンで実行するために，ソースコード変換により処理中断時のローカル変数の取得およびその再現，そして中断箇所からの実行再開を実現する方法を提案してきた。本論文では，従来手動で行っていたソースコード変換を，JavaCCを用いて自動化した実装方式について述べる。

三浦　純・甲斐宗徳：「C言語自動並列化トランスレータの開発　―ポインタ／配列依存解析の改良とタスク粒度の決定―」，成蹊大学理工学研究報告，Vol.45，No.1，pp.31-38，2008.6

マルチプロセッサシステムでは並列性と効率性を考慮したプログラムでないと優れた性能を十分に引き出すことができない。そのためプログラムの記述者にはソフト及びハードの詳細な知識が必要となり，マルチプロセッサシステムの有効利用という点で大きな障害となっている。この問題を解決する手段として自動並列化トランスレータが挙げられる。ただしプログラム内の単純なループ並列性のみを抽出するような単一粒度を対象とした並列化を行うのではなく，関数や関数を含んだループ及びループ間などの粗粒度並列性と，ステートメントレベルの細粒度並列性をはじめ，様々な粒度の並列性を引き出すことが自動並列化トランスレータには望まれる。本論文では，細粒度タスクから粗粒度タスクまでの幅広い並列性を引き出し，その中から実行性能の向上に有効と判断された並列性を活かす手法を提案する。解析対象には従来困難とされていたポインタを用いたプログラムも含まれる。また並列実行時の性能と並列化トランスレータ全体の解析時間を減らすことを考慮し，データの局所性を利用したタスク粒度の決定手法も合わせて提案する。

Hiroko Midorikawa, Motoyoshi Kurokawa, Ryutaro Himeno, Mitsuhisa Sato：“DLM: A Distributed Large Memory System using Remote Memory Swapping over Cluster Nodes”, Proc. of IEEE Cluster Computing (Cluster2008), pp.268-273, 2008.9

邦文題目：クラスタノード上における遠隔メモリページングを利用した大規模分散メモリシステムDLM

The 64bitOS supplys a huge amount of memory address space that is essential for new applica-

tions using very large data. It is expected that the memory in connected nodes can be used to store swapped pages efficiently, especially in a dedicated cluster which has a high-speed network such as 10GbE and Infiniband. In this paper, we propose the Distributed Large Memory System (DLM), which provides very large virtual memory by using remote memory distributed over the nodes in a cluster. The performance of DLM programs using remote memory is compared to ordinary programs using local memory. The results of STREAM, NPB and Himeno benchmarks show that the DLM achieves better performance than other remote paging schemes using a block swap device to access remote memory. In addition to performance, DLM offers the advantages of easy availability and high portability, because it is a user-level software without the need for special hardware. To obtain high performance, the DLM can tune its parameters independently from kernel swap parameters. We also found that DLM's independence of kernel swapping provides more stable behavior.

緑川博子・黒川原佳・姫野龍太郎：「遠隔メモリを利用する分散大容量メモリシステムDLMの設計と10GbEthernetにおける初期性能評価」,情報処理学会論文誌コンピューティングシステム，Vol.1，No.3, pp.136-157, 2008,12

64bitOSの普及により，飛躍的に大きなアドレス空間が利用可能となった。我々はローカル物理メモリサイズに制限されず，クラスタの各ノードの遠隔メモリを集めて仮想的に大容量メモリを逐次処理用に提供するシステム，分散大容量メモリシステムDLMを新たに提案した。また通常の逐次プログラムからの変更を最小限にする独自のAPIとDLMコンパイラもあわせて構築した。ローカルハードディスクをスワップデバイスとする通常OSのスワップ利用時との比較では，行列ベクトル積プログラムの実行で，1Gb/10Gb Ethernet結合クラスタで，通常プログラムの5～10倍以上の性能が得られるだけでなく，スワップシステム利用時よりも安定動作を示すことを見出した。また，10GbEthernetクラスタにおいて，ローカルメモリのみを使用する通常プログラムとDLM利用プログラムについて，NPB，HimenoBMT, STREAMなどのメモリアクセス負荷の高いベンチマークを用いた性能比較をおこなった。この結果，ブロックデバイス構築方式，専用NICや低レベル通信プロトコルを用いる他の低レベル実装の手法に比べ，汎用TCPとユーザレベルソフトウエアのみを用いたDLMが，より高い性能を示すことを新たに見出した。DLMは他のの遠隔ページング手法とは異なり，OSスワップシステムとは独立であるため，用いるネットワークなどに応じた自由なパラメタ設定を行って最大性能を引き出すことが可能である。また，OSスワップデーモン稼動時における動作不安定性や様々なトラブルとも無縁である。近年省みられることのなかったユーザレベルソフトウエアによる手法を，最新スレッド技術と高速ネットワークを用いて再評価し，遠隔メモリを利用した仮想大容量メモリを実現する一つの手法として，DLMの有効性を示した。

Taku Itoh, and Yoshifumi Kanda：“Surface Reconstruction from 3D Scattered Points with Normals Using Both Delaunay Tetrahedralization and Implicit Function.” In Proceedings of Asia Simulation Conference 2008, pp. 950-955, Beijing, 2008.10

本論文では，Delaunay分割と陰関数を使用した3次元の可視化法を提案する。本方法では，節点に加えて，各節点における法線情報も必要となるが，Delaunay分割を主に使うことで高速な可視化が可能である。また，Delaunay分割結果に不要な面が発生した場合においても，陰関数の性質を利用することで，可視化結果を修正できる。数値実験では，パラメータを適切に設定することで，本方法が前述の特徴をもっていることを示した。

K.Hatakeyama, S.Tsumura and S.Kuribayashi：“Fair joint multiple resource allocation method in all-IP networks”, APCC2008, 15-PM1-F-3, 2008.10
邦文題目：オールIPネットワークにおける公平性を考慮した複数種別資源同時割り当て方式

In all-IP networks including NGN, both computing and network resources are required to be allocated simultaneously to each service request. The authors proposed optimal joint resource allocation methods for multiple resource types. Although those methods can achieve an efficient use of resources, it may result in an ‘unfair’ use of

resources in which resources may be monopolized by a specific service.

This paper proposes basic principles for achieving 'fairness' among multiple services, assuming that both computing and network resources are required to be allocated simultaneously to each service request, and proposes a measure for evaluating fair allocation. Next, this paper proposes a fair joint multiple resource allocation method which tries to equalize the total amount of key resources allocated for each service in each time block. Key resource is the resource type for which the total amount of requested resource is the largest proportion of the maximum resource of that type. It is demonstrated by simulation evaluations that the proposed method enables fair allocation among multiple services.

S. Kuribayashi and K. Hatakeyama："System virtualization method for RFID tag infrastructure network", ISCIS2008, Wireless I-4, 2008.10
邦文題目：RFIDタグネットワークシステムの仮想化方式

The use of RFID tag which identifies a thing and an object will be expanded with progress of ubiquitous society, and it is supposed that the various RFID-based services will be provided in the near future. Therefore, it is necessary to study how to construct RFID network system as a social infrastructure like the Internet.

This paper proposes the virtualization method of RFID tag network system to enable the same physical RFID network system to be used by multiple different service systems. The system virtualization not only reduces the system cost but also can dramatically reduce the installation space of physical readers and the operation cost. It is proposed that all equipments in the RFID network system except RFID tag could be shared with the conventional virtual technologies for servers or networks. It is also proposed to add two new identifiers, in order to improve user convenience in the RFID tag infrastructure network system. One is 'system ID' to keep the association between a virtual reader element and a physical RFID tag, and the other is 'policy number' that specifies the conditional tag ID processing.

K.Hatakeyama, Y.Osana and S.Kuribayashi："Flexible joint resource reallocation method in all-IP networks", ICOIN2009, 4A-4, 2009.1
邦文題目：オールIPネットワークにおける柔軟な複数資源同時割り当て方式

In all-IP networks where all types of services are integrated using IP technology, it is highly likely that traffic congestion in one service causes congestion in other services, or that abnormal traffic in one service degrades the quality of other services.

This paper proposes a flexible reallocation of both computing and network resource between services, in order to reduce the chance of congestion in an all-IP network, assuming that both computing and network resources are simultaneously allocated to each service request. This paper clarifies the method of determining whether resource reallocation is possible and, if so, the optimal amount of resources to be reallocated. It is demonstrated by simulation evaluations that the proposed reallocation scheme can avoid congestion even in cases where the number of service requests received by the network greatly exceeds the number at which congestion occurs.

畠山賢一・栗林伸一：「ユーザが広告を選択するテレビ番組コンテンツ配信サービスの提案」, 成蹊大学理工学研究報告Vol.45, No.1, pp.39-42, 2008

本論文では，複数ある広告の中から視聴者が好きな広告を選択し，その広告を視聴後に好きなテレビ番組を視聴する新たな広告モデルを提案している。また，提案モデル実現に必要な広告掲載位置，広告視聴により得られるクーポン量，広告視聴により視聴可能となる番組との連結，番組クーポン量，などの決定法などに対する解決策も提案している。特に，視聴率をベースとした従来の広告費算出法ではなく，インターネットのアドワーズ広告に類似したオークションを基本とした方式である。提案モデルは視聴者，スポンサー，テレビ局，広告制作会社，番組制作会社のすべの立場にメリットがあると考えられる。

畠山賢一・栗林伸一：「複数種別資源同時割当てを前提とした次世代ネットワークふくそう制御方式」，成蹊大学理工学研究報告Vol.45, No.2, pp.75-83, 2008

本論文は，オールIPネットワークのふくそう制御方式として資源融通方式と特定要求種別規制方式を取り上げ，その実現法または実現上の課題を明らかにしている。ふくそう発生回避対策と位置付けられる資源融通方式については，4つの資源融通形態ごとに資源融通の可否と融通量の決定手順を明らかにしている。また，シミュレーション評価により資源融通を実施しない従来方式に比べサービス要求処理数を大幅に増加させ，ふくそうを回避する効果が期待できることを明らかにしている。さらに，特定要求種別規制方式については，ふくそう資源種別を多く必要とする要求をだけを規制する方法とふくそう資源種別を多く必要とする要求の要求資源量そのものを小さくする方法の２つの考え方を提案し，それらを実現するために必要な課題を整理している。

杉山賢二, 相良直哉, 横山和彦：「符号化ブロックひずみ軽減のためのひずみ量客観評価方法」，電子情報通信学会論文誌A, Vol.J91-A, No.6, pp.643-646, 2008.6

復号化後の画像におけるブロック歪量の評価は，歪軽減フィルタの制御などのため重要である。評価手法はいくつか提案されているが，符号化前の参照画像が必要であるか，歪量を相対値としてしか評価できないなどの問題がある。本報告では，参照画像を必要とすることなく，歪量を絶対値として評価できる手法を提案する。具体的にはブロック境界部分の隣接画素差とブロック内部の隣接画素差の比をとることによりブロック歪量を検出する。実験は，符号化の量子化を変化させ歪量を徐々に増やした画像に対して評価を行い，提案手法の評価結果が適切なことを確認する。

Arjan Durresi, Leonard Barolli, Akio Koyama, and Makoto Takizawa：“Ubiquitous QoS Communications Using Scalable Satellite Networking,” Journal of Ubiquitous Computing and Intelligence (JUCI), Vol.2, No.1, pp.1-8, April 2008

邦文題目：大規模衛星ネットワークを用いたユービキタスQoS通信

Satellite networking will be an important component of future ubiquitous communications systems. Satellite networks will be especially useful to interconnect remote sensor networks. Therefore, satellite networks should provide the needed QoS, differentiation of services and at the same tame keep the required scalability. We propose a new Diffserv-based scheme of bandwidth allocation during congestion, called proportional allocation of bandwidth (PAB). PAB can be used in GEO, MEO and LEO satellite networks. In PAB, during congestion all flows get a share of IP available bandwidth, which is in proportion to their subscribed information rate. We suggest a method for implementing PAB without storing per-flow state, which makes the scheme scalable and simple. We show by simulation the advantages of using PAB in IP satellite networks.

Kiyohiro Morita, Ailixier Aikebaier, Tomoya Enokido, and Makoto Takizawa：“A Data Transmission Protocol for Reliable and Energy-Efficient in a Wireless Sensor-Actuator Network,” International Journal of Telecommunication Systems (IJTS), Vol.38, Nos.3-4, pp.71-82, Aug. 2008

邦文題目：無線センサ・アクチュエータ・ネットワークでの信頼性のある低電力データ転送プロトコル

In a wireless sensor-actuator network, sensor nodes gather information on the physical world and can deliver messages with sensed values to only nearby nodes due to weak radio. Thus, messages sent by nodes might be lost due to not only collision but also noise. Messages are forwarded by sensor nodes to an actuator node. In the redundant data transmission (RT) protocol, a sensor node sends a message with not only its sensed value but also sensed values received from other sensor nodes. Even if a message with a sensed value v is lost, an actuator node can receive the value v from a message sent by another sensor node. In addition, we have to reduce the energy consumption of a sensor node. A sensor node mainly consumes the energy to send and receive messages. Even if an event occurs, only some number of sensor nodes sensing the event send the sensed values to reduce the total energy consumption. We discuss an energy-efficient data

transmission protocol. We evaluate the RT protocol compared with the CSMA protocol in terms of how much sensing data a node can receive in presence of messages loss. We evaluate the RT protocol in terms of how many number of sensed values an actuator node can receive in presence of message loss. We show that about 72 % of sensed values can be delivered to an actuator node even if 95 % of messages are lost due to noise and collision.

Ailixier Aikebaier, Tomoya Enokido, and Makoto Takizawa：“A Distributed Coordination Protocol in an Order-Heterogeneous Group,” International Journal of Web and Grid Services (IJWGS), Vol.4, No.1, pp.5-23, 2008.
邦文題目：順序異種グループでの分散協調プロトコル

In Peer-to-Peer (P2P) overlay networks, a group of multiple peer processes are required to cooperate to make a global decision. Each process takes a value and exchanges values with the other processes until the agreement condition is satisfied. We define existentially and preferentially precedent relations which show what values a process can take after taking a value and which value a process prefers to another value, respectively. Based on the precedent relations, each process takes the most preferable value in the values which are changeable from current value, at each round. We discuss a coordination protocol among multiple values in a type of heterogeneous system, where some pair of processes has different precedent relations on the same domain. A process learns the precedent relations of another process through exchanging values. A process takes a value that other processes can take by using the knowledge on the other processes.

Keiji Ozaki, Kenichi Watanabe, Naohiro Hayashibara, Tomoya Enokido, and Makoto Takizawa：“A Fault-Tolerant Model of Wireless Sensor-Actuator Network,” International Journal of Distributed Sensor Networks (IJDSN), Vol.4, No.2, pp.110-128, April 2008
邦文題目：無線センサ・アクチュエータ・ネットワークのフォールト・トレラント・モデル

In a wireless sensor and actuator network (WSAN), a group of sensor nodes, actuators, and actuation devices are geographically distributed and linked by wireless networks. Sensor nodes gather information for an event occurring in the physical world and send the sensed values to actuators. Actuators perform appropriate actions on actuation devices on receipt of sensed values from sensor nodes. Sensor nodes are low cost, low powered devices with limited energy, computation, and wireless communication capabilities. Sensor nodes may suffer from arbitrary faults. Furthermore, wireless communications are unreliable due to collision and noise of a wireless channel and shortage of power of sensor nodes. Reliable efficient communication among sensor nodes, actuators, and actuation devices is required in presence of faults. In order to realize the reliability and efficiency, we newly propose a multi-actuator/multi-sensor (MAMS) model where each sensor node sends sensed values to multiple actuators and each actuator receives sensed values from multiple sensor nodes for each event occurring in an event area. Even if some number of sensor nodes and actuators are faulty and messages sent by sensor nodes and actuators are lost, a required action can be performed on actuation devices. Actuators are required to receive some messages from some number of sensor nodes to make a decision on what actions to be performed on actuation devices. There are principally a pair of models, active and passive models to coordinate multiple actuators to make a decision on actions and perform the actions. In the active model, multiple actuators receive some messages from sensor nodes and perform the actions on actuation devices. Here, multiple actuators may perform actions on receipt of sensed values. Multiple redundant executions of an action on each device have to be prevented and conflicting actions on each actuation device from multiple actuators have to be serialized. In this paper, we discuss a method to reliably and non-redundantly perform actions. On the other hand, there is one primary actuator and multiple

backup actuators in the passive model. Only the primary actuator performs actions. In this paper, we present a semi-passive coordination (SPC) model where not only primary but also backup actuators receive messages from sensor nodes. Only one actuator performs an action on an actuation device and a backup actuator takes over the primary one if the primary gets faulty.

Keiji Ozaki, Tomoya Enokido, and Makoto Takizawa：“Coordination Protocols for a Reliable Sensor, Actuator, and Device Network,” International Journal of Mobile Information Systems (IJMIS), Vol.4, No.2, pp.147-161, 2008

邦文題目：センサ・アクチュエータ・デバイス・ネットワークの協調プロトコル

A sensor, actuator, and device network (SADN) is composed of three types of nodes, which are sensor, actuator, and actuation device nodes. Sensor nodes and actuator nodes are interconnected in wireless networks as discussed in wireless sensor and actuator networks (WSANs). Actuator nodes and device nodes are interconnected in types of networks, i.e. wireless and wired network. Sensor nodes sense an physical event and send sensed values of the event to actuator nodes. Actuator nodes make a decision on proper actions on receipt of sensed values and then issue the action requests to the device nodes. A device node really acts to the physical world, e.g. moves a robot arms by performing the action on receipt of the action request. Messages may be lost and nodes may be faulty. Especially, messages are lost due to noise and collision in a wireless network. We propose a fully redundant model for an SADN where each of sensor, actuator, and device functions is replicated in multiple nodes and each of sensor-actuator and actuator-device communication is realized in many-to-many type of communication protocols. Even if some number of nodes are faulty, the other nodes can perform requested tasks. Here, each sensor node sends sensed values to multiple actuator nodes and each actuator node receives sensed values from multiple sensor nodes. While multiple actuator nodes communicate with multiple replica nodes of a device. Even if messages are lost and some number of nodes are faulty, device nodes can surely receive action requests required for sensed values and the actions are performed. In this paper, we discuss a type of semi-passive coordination (SPC) protocol of multiple actuator nodes for multiple sensor nodes. We discuss a type of active coordination protocol for multiple actuator nodes and multiple actuation device nodes. We evaluate the SPC protocol for the sensor-actuator coordination in terms of the number of messages exchanged among actuators.

Markus Aleksy, Ralf Gitzel, Gerhard Vollmar, Nicolaie Fantana, Christian Stich, and Makoto Takizawa：“Techniques for the Efficient Resource Management of Context-Sensitive Mobile Applications and their Utilization in Industrial Field Service,” Journal of Mobile Multimedia (JMM), Vol.4, Nos. 3/4, pp.200-209, 2008

邦文題目：産業領域サービスでのコンテキスト依存のモバイル応用での有効な資源管理とその利用

Context-sensitive mobile applications require a certain amount of flexibility due to the fact that they have to provide services for many different situations. The limited resources available make resource management a major challenge in such applications. In this paper, we present different techniques for the efficient use of resources of mobile devices. These techniques support the development of adaptable and flexible context-sensitive applications. Afterwards, we present some application scenarios from industrial field service in which some of these techniques can be utilized to improve service processes by providing tailored information and knowledge support.

Ailixier Aikebaier, Valbona Barolli, Tomoya Enokido, and Makoto Takizawa：“ A Protocol for Making an Agreement in a Peer-to-Peer (P2P) Society,” Journal of Interconnection Networks (JOIN), Vol.9, No.4, pp.317-335, 2008

邦文題目：P2P社会での合意形成プロトコル

There are many discussions on agreement protocols of multiple peer processes (peers) where every peer just aims at agreeing on one value out of values shown by the peers. In meetings of human societies, agreement procedures are so flexible that persons can change their opinions and can use not only all-condition where every person agrees on one value but also various types of agreement conditions like majority-condition. In this paper, we discuss a flexible agreement protocol of multiple peers by taking into account human behaviors in social agreement procedures. Each peer first takes a value $v1$ and notifies the other peers of the value $v1$. A peer pi in turn receives values from other peers. Unless a set of the values from all the peers satisfy the agreement condition, the peer pi can take another value $v2$. In order to model the social human behavior, in our previous work we discussed E- and P-precedent relations $\rightarrow Ei$ and $\rightarrow Pi$ on values of a peer pi. The relations $v1 \rightarrow Ei\ v2$ and $v1 \rightarrow Pi\ v2$ show that a peer pi can take a value $v2$ after taking a value $v1$ and prefers $v1$ to $v2$, respectively. If a peer autonomously takes values based on its precedent relations, the peers might not make an agreement even if there exists a satisfiable set of previous values. We discuss what previous values the peer can take again. In this paper, we try to find a satisfiable set of previous values in a history of values which the peers have so far taken, in addition for each peer to taking a new value at each round.

Ailixier Aikebaier, Tomoya Enokido, and Makoto Takizawa：“Design and Evaluation of Reliable Data Transmission Protocol in Wireless Sensor Networks,” International Journal of Mobile Information Systems, Vol.4, No.3, pp.237-252, 2008

邦文題目：無線センサ・ネットワークでのデータ転送プロトコルの設計と評価

A wireless sensor-actuator network (WSAN) is composed of sensor modes and actuator modes which are interconnected in wireless networks. A sensor node collects information on the physical world and sends a sensed value in a wireless network. Another sensor node forwards the sensed value to deliver to an actuator node. A sensor node can deliver messages with sensed values to only nearby nodes due to weak radio. Messages are forwarded by sensor nodes to an actuator node by a type of flooding protocol. A sensor mode senses an event and sends a message with the sensed value. In addition, on receipt of a message with a sensed value from another sensor mode, a sensor node forwards the sensed value. Messages transmitted by sensor nodes might be lost due to noise and collisions. In this paper, we discuss a redundant data transmission (RT) protocol to reliably and efficiently deliver sensed values sensed by sensor nodes to an actuator node. Here, a sensor node sends a message with not only its sensed value but also sensed values received from other sensor nodes. The more number of sensed values are included in a message, the more frequently the message is lost. Each message carries so many number of sensed values that the message loss ratio is not increased. Even if a message with a sensed value v is lost in the wireless network, an actuator node can receive the sensed value v from a message sent by another sensor node. Thus, each sensed value is redundantly carried in multiple messages. The redundancy of a sensed value is in nature increased since the sensed value is broadcast. In order to reduce the redundancy of sensed value, we take a strategy that the farther sensor nodes from an actuator node forward the fewer number of sensed values. We evaluate the RT protocol in terms of loss ratio, redundancy, and delay time of a sensed value. We show that about 80% of sensed values can be delivered to an actuator node even if 95% of messages are lost due to noise and collision.

Valbona Barolli, Heihachiro Fukuda, Leonard Barolli, and Makoto Takizawa：“A High Performance Computing Model for Marketable Quality and Profitability of Corporations,” International Journal of High Performance Computing and Networking (IJHPCN), Vol.5, Nos.5/6, pp.343-352, 2008

邦文題目：企業の市場品質と利益性の高性能計算モデル

In this paper, we provide an evaluation model for marketable quality and profitability of corporations. We apply the real values of some leading manufacturing corporations in Japan to our proposed model to analyse its accuracy. From the analysis, we concluded that the theoretical and real standard values of the marketable quality indicator were both 0.6. We showed that the proposed model gives a good approximation of economic trends of Japanese corporations. We obtained a general distribution of profitability by using the general profitability function and the marketable quality indicator. The general distribution is closer to the real value compared with the standard distribution.

Alireza GoudarziNemati and Makoto Takizawa: "Data Transmission Procedure for a Multi-Source Streaming Model in Mobile Peer-to-Peer Overlay Networks," Journal of Mobile Multimedia (JMM), Vol. 5, No.1, pp.45-63, 2009

邦文題目：モバイルP2Pオーバレイ・ネットワークでの多ソース・ストリーミング・モデルのデータ転送手続き

In peer-to-peer (P2P) overlay networks, multimedia contents are in nature distributed to peers by downloading and caching. Here, a peer which transmits a multimedia content and a peer which receives the multimedia content are referred to as source and receiver peers, respectively. A peer is realized in a process of a computer and there are mobile and fixed types of computers. A peer on a mobile computer moves in the network. Furthermore, a peer maybe realized as a mobile agent. Thus, not only receiver peers but also source peers might move in the network. In this paper, we would like to discuss how source peers deliver multimedia contents to receiver peers in a streaming model so that enough quality of service (QoS) required is supported in change of QoS of network and peer, possibly according to the movements of the peers. In this paper, we discuss a multi-source streaming (MSS) protocol where a receiver peer can receive packets of a multimedia content from multiple source peers which can support enough QoS. If a current source peer is expected to support lower QoS than required, another source peer takes over the source peer and starts sending packets of the multimedia content. The receiver peer is required to receive packets of the multimedia content with enough QoS, e.g. no packet loss even if the source peer is being switched with a new source peer. We discuss how to switch source peers so as to support enough QoS to the moving receiver peer. We evaluate the MSS protocol in terms of the fault ratio, i.e. how frequently the receiver peer fails to receive packets with enough QoS and show the MSS protocol can reduce the fault ratio.

Mimoza Durresi, Vamsi Paruchuri, Arjan Durresi, Leonard Barolli, and Makoto Takizawa: "A Scalable Anonymous Protocol for Heterogeneous Wireless Ad Hoc Networks," Journal of Embedded Computing, Vol.3, No.1, pp.77-85, 2009

邦文題目：異種無線アドホック・ネットワークのための大規模プロトコル

Ensuring anonymity in wireless and hoc networks is a major security goal. Using traffic analysis, the attacker can compromise the network functionality by correlating data flow patterns to event locations/active areas. In this paper we present a novel Scalable Anonymous Protocol that hides the location of nodes and obscure the correlation between event zones and data flow from snooping adversaries. We quantify the anonymity strength of our protocol by introducing a new anonymity metric: Degree of Exposure Index. Our protocol is designed to offer flexible tradeoffs between degree of anonymity and communication-delay overhead.

Naohiro Hayashibara and Makoto Takizawa: "Design of the Notification System for Failure Detectors," International Journal of High Performance Computing and Networking (IJHPCN), Vol.6, No.1, pp.25-34, 2009.

邦文題目：故障検出のための通知システムの設計

It is widely recognized that distributed systems would greatly benefit from the availability of a

generic failure detection service. In this paper, we highlighted the issue on the construction of the monitoring network of failure detectors. We proposed an algorithm to construct and manage the monitoring network that each failure detector is monitored by some failure detectors. Notification of failures is propagated along the network. Especially it can involve various types of failure detectors from simple timeout-based failure detectors to accrual failure detectors, and help to spread information on suspected processes/nodes. In addition, we have made a simulation of the proposed algorithm for constructing the monitoring network. It shows that the algorithm is scalable for increasing the number of failure detectors.

Tomoya Enokido and Makoto Takizawa: "A Purpose-based Synchronization Protocol of Multiple Transactions in Multi-Agent Systems," International Journal of Business Intelligence and Data Mining (IJBIDM), Vol.4, No.1, pp.99-117, 2009

邦文題目：マルチ・エージェント・システムでのトランザクションの目的ベースの同期方式

Multiple agents cooperate with each other through manipulating objects. A transaction is a unit of work issued by an agent. A transaction is assigned with a purpose which is a subfamily of roles granted to the agent. Even if transactions issue methods according to the purposes, illegal information flow might occur. We define legal, independent, illegal, and possibly illegal information flow relations among purposes. We discussed the purpose-based marking protocol to prevent illegal information flow. Then, we discussed the releasing mechanism of purpose marks to improve the throughput. Finally, we evaluated the Purpose-based Marking and Releasing (PMR) protocol.

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Youhei Tanaka, Tomoya Enokido, and Makoto Takizawa: "Transactional Agents on Distributed Object Systems," International Journal of High Performance Computing and Networking (IJHPCN), Vol.6, No.2, pp.148-159, 2009

邦文題目：分散オブジェクト・システムのトランザクション・エージェント

A transactional agent is a mobile agent to manipulate objects distributed on computers. A transactional agent can change a schedule to visit computers if some target computer is faulty. In order to reduce the communication overhead, a transactional agent is composed of routing and manipulation subagents. A routing subagent makes a decision on what computer to visit in presence of faults of computers. On arrival at the computer, the routing subagent loads classes of a manipulation subagent to locally manipulate objects. We evaluate the transactional agent model in terms of access time compared with the traditional client-server model.

Kenichi Watanabe, Tomoya Enokido, and Makoto Takizawa: "Trustworthiness of Acquaintances in Peer-to-Peer Overlay Networks," International Journal of High Performance Computing and Networking (IJHPCN), Vol.6, No.2, pp.160-171, 2009

邦文題目：P2Pオーバレイ・ネットワークでの知人ピアの信用可能性

Various types of applications manipulate objects distributed in Peer-to-Peer overlay networks. An acquaintance peer of a peer p is a peer whose service the peer p knows and with which the peer p can directly communicate. We discuss types of acquaintance relations among peers and how much a peer trusts each acquaintance peer. We define the trustworthiness of each acquaintance peer in terms of the acquaintance relations. We discuss a Charge-Based Flooding (CBF) algorithm to find target peers so that more trustworthy areas in Peer-to-Peer overlay networks are more deeply searched. We evaluate the CBF algorithm compared with a TTL-based algorithm.

栗原陽介・見澤圭吾・渡辺嘉二郎・小林一行：「LPガス用エネルギー回収型圧力調整器の開発」, 計測自動制御学会論文集，Vol.45，No.3，pp.177‐182，2009.3

The development of electronics devices yields circuits which operates with low power consumption. This paper is aimed at describing a novel

power supply system to such the devices. The energy levels diverged by mechanical vibration, pressure drops by regulators, thermal diverged, are low in the mechanical field but high enough to operate the electronics devices above. Here we describe a novel energy collecting method from pressure regulators in which high pressure is regulated to constant low pressure. In the regulation, energy is diverged. The method converts gas flow to rotation by a pneumatic motor and generates electric power by a generator connected with the motor. An LP gas regulator under normal use in a house diverges about 30W energy. The devices developed here collected about 9W energy which is enough high for operating electronics devices around LP gas including intelligent gas meter.

小林一行・渡辺嘉二郎・大久保友幸・栗原陽介：「パーソナルビークルのための屋外環境における白線検出法の一提案」, 電気学会論文誌C, Vol.129, No.3, pp.497 - 504, 2009.3

By the word “Personal vehicle”, we mean a simple and lightweight vehicle expected to emerge as personal ground transportation devices. The motorcycle, electric wheelchair, motor-powered bicycle, etc. are examples of the personal vehicle and have been developed as the useful for transportation for a personal use. Recently, a new types of intelligent personal vehicle called the Segway has been developed which is controlled and stabilized by using on-board intelligent multiple sensors. The demand for needs for such personal vehicles are increasing, 1) to enhance human mobility, 2) to support mobility for elderly person, 3) reduction of environmental burdens. Since rapidly growing personal vehicles' market, a number of accidents caused by human error is also increasing. The accidents are caused by it's drive ability. To enhance or support drive ability as well as to prevent accidents, intelligent assistance is necessary. One of most important elemental functions for personal vehicle is robust lane detection. In this paper, we develop a robust lane detection method for personal vehicle at outdoor environments. The proposed lane detection method employing a 360 degree omni directional camera and unique robust image processing algorithm. In order to detect lanes, combination of template matching technique and Hough transform are employed. The validity of proposed lane detection algorithm is confirmed by actual developed vehicle at various type of sun shined outdoor conditions.

栗原陽介・河西良拓・渡辺嘉二郎・小林一行・田中　博：「フローリング，畳の上，および浴槽，トイレ内における生活者の生体情報モニタリング」, 計測自動制御学会論文集，Vol.45，No.2，pp.91 - 98，2009.2

In the graying Japanese society, monitoring health-related human data with sensors embedded in the living environment is quite meaningful in terms of emergency response and of long-term health management. In using the body data monitoring system daily at home, the lack of invasiveness during the monitoring and the maintenance of the system are of great importance. We have proposed the method to surmise the sleep stages of sleeping subjects by measuring the heartbeats and the respirations without invasiveness using the pneumatic method with an air mattress. This method, however, has a problem in the maintenance, since it requires periodic refilling of the air into the mattress. In this paper, another pneumatic method, which applies silicon tubes instead of the air mattress, is proposed. The change of S/N ratio in heartbeat and respiration signals, while having the environmental noises increased, are compared among a room with wooden flooring, another with tatami mats, a bath tub, and a toilet room. The result shows that both the pulse waves and the breaths can be measured with the accuracy of around 30dB, and the identification of each pulse from among the pulse waves is also feasible, under the condition that the environmental noises in the room with wooden flooring, that with tatami mats, the bath tub, and the rest room are 0.01G, 0.09G, 100ml, and 0.01G respectively.

小林一行・御園祐介・渡辺嘉二郎・大久保友幸・栗原陽介:「複素拡張カルマンフィルタを用いたウェイポイントナビゲーションの実装」, 知能情報ファジィ学会誌, Vol.21, No.1, pp.90 - 99, 2009.2

This paper describes an implementation of mobile robot waypoint navigation system which is compliant to Intelligent Ground Vehicle Competition（IGVC） navigation challenge rules. The IGVC is one of mobile robot competition that has been sponsored by AUVSI(Association for Unmanned Vehicle Systems International) since 1993. Navigation challenge is one of the IGVC challenges that assume to use GPS navigation system. Several waypoints are assigned by longitude and altitude coordinate system as global waypoint map. Based on global waypoint map, the proposed waypoint navigation system incrementally builds both an accurate global trajectory map and global obstacle map by using complex extended Kalman filter. The feature of proposed implementation is employing simple map management algorithm and self-localization and landmark data association. To confirm the validity of proposed waypoint navigation system, an electric wheelchair based mobile robot is used for implementation and tested actual outdoor experiments.

栗原陽介・渡辺嘉二郎・小林一行・田中　博:「脈波, 呼吸成分の平均相互情報量を用いた寝姿勢の変化にロバストな無呼吸時間検出法」, 計測自動制御学会論文集, Vol.45, No.1, pp.11 - 17, 2009.1

Sleep disorders disturb the recovery from mental and physical fatigues, one of the functions of the sleep. The majority of those who with the disorders are suffering from Sleep Apnea Syndrome (SAS). Continuous Hypoxia during sleep due to SAS cause Circulatory Disturbances, such as hypertension and ischemic heart disease, and Malfunction of Autonomic Nervous System, and other severe complications, often times bringing the suffers to death. In order to prevent these from happening, it is important to detect the SAS in its early stage by monitoring the daily respirations during sleep, and to provide appropriate treatments at medical institutions. In this paper, the Pneumatic Method to detect the Apnea period during sleep is proposed. Pneumatic method can measure heartbeat and respiration signal. Respiration signal can be considered as noise against heartbeat signal, and the decrease in the respiration signal due to Apnea increases the Average Mutual Information of heartbeat. The result of scaling analysis of the average mutual information is defined as threshold to detect the apnea period. The root mean square error between the lengths of Apnea measured by Strain Gauge using for reference and those measured by using the proposed method was 3.1 seconds. And, error of the number of apnea times judged by doctor and proposal method in OSAS patients was 3.3 times.

栗原陽介・渡辺嘉二郎・小林一行・田中　博:「ストレッチャー搬送時における無拘束呼吸計測と動的閾値法による呼吸停止検知法」, 電気学会論文誌C, Vol.128, No.11, pp.1641 - 1648, 2008.11

General anesthesia used for surgical operations may cause unstable conditions of the patients after the operations, which could lead to respiratory arrests. Under such circumstances, nurses could fail in finding the change of the conditions, and other malpractices could also occur. It is highly possible that such malpractices may occur while transferring a patient from ICU to the room using a stretcher. Monitoring the change in the blood oxygen saturation concentration and other vital signs to detect a respiratory arrest is not easy when transferring a patient on a stretcher. Here we present several noise reduction system and algorithm to detect respiratory arrests in transferring a patient, based on the unconstrained air pressure method that the authors presented previously. As the result, when the acceleration level of the stretcher noise was 0.5G, the respiratory arrest detection ratio using this novel method was 65%, while that with the conventional method was 0%.

Yosuke Kurihara, Kajiro Watanabe, Toshiyuki Kikuchi, Takashi Namba, Hiroshi Tanaka : “Potentialities

of the Pneumatic Biosensing Bed as a Network Terminal for Ubiquitous Health Monitoring and Medical Care”, Transactions on electrical and electronic engineering, Vol.3, pp.632 - 641, 2008.11
邦文題目：ユビキタス情報社会における健康管理のための，空気圧方式による生体情報センシングベッドの可能性

This research examined how the pneumatic bio-sensing bed works as a network terminal for ubiquitous health monitoring and medical care. A constraint-free bio-sensing bed, which is an ordinary family bed optimally equipped with a sensing device connected to a ubiquitous network, was designed. Heartbeat, respiration, snoring and body movements of 32 subjects while in bed at their home for 14 months were measured and transmitted to the data center via the network. The system provided clear real-time bio-signals on apnea from subjects with Sleep Apnea Syndrome and arrhythmia from subjects with myocardial infarction. It also provided a variety of one-night, one-week and one-year medical information required for in-home health monitoring. Measurement availability of the proposal system was 76.08% for the total times. The pneumatic bio-sensing bed connected to the network showed high potential for ubiquitous health monitoring and in-home medical care.

Yosuke Kurihara, Kajiro Watanabe, Kazuyuki Kobayashi : “Observer Based on Body Movement Information in Sleeping and Estimation of Sleep Stage Appearance Probability”, Transactions on electrical and electronic engineering, Vol.3, pp.688 - 695, 2008.11
邦文題目：睡眠中の体動情報を基にしたオブザーバーと睡眠段階出現確率の推定

The manual for scoring sleep defined by American Academy of Sleep Medicine in 2007 contains some rules that, even as an international standard of sleep stage judgment, include ambiguities and are thus compensated by subjective interpretations of sleep stage scores. This paper presents a novel method for compensating the subjective interpretations and judgments and describing the judgments in probabilistic terms. We employed a full-order Luenberger observer (state estimation method) based on two models of sleep transition: no body movement and body movement. Sleep stages judged by three different scorers under the rules of the manual were rejudged by the observer. The average values of κ statistics, which show the degree of agreement, were 0.83, 0.89 and 0.81, respectively, for the original sleep stages. Because the new method provides probabilities on how surely the sleep belongs to each sleep stage, we were able to determine the most, second most and third most probable sleep stage. The κ statistics between the most probable sleep stages were improved to 0.89, 0.93 and 0.85, respectively. Those of sleep stages determined from the most and second most probable were 0.93, 0.96 and 0.90 and those from the most, second most and third most probable were 0.95, 0.97 and 0.92.

栗原陽介・渡辺嘉二郎・小林一行・田中　博：「睡眠時における脈波の相互情報量によるデルタ波出現率の推定」，電気学会論文誌C，Vol.128，No.10，pp.1550 - 1556，2008.10

The quality of sleep is evaluated based on the sleep stages judged by R-K method or the manual of American Academy of Sleep Medicine. The brainwaves, eye movements, and chin EMG of sleeping subjects are used for the judgment. These methods above, however, require some electrodes to be attached to the head and the face to obtain the brainwaves, eye movements, and chin EMG, thus making the measurements troublesome to be held on a daily basis. If non-invasive measurements of brainwaves, eye movements, and chin EMG are feasible, or their equivalent data can be estimated through other bio-signals, the monitoring of the quality of daily sleeps, which influences the health condition, will be easy. In this paper, we discuss the appearance rate of delta wave occurrences, which is deeply related with the depth of sleep, can be estimated based on the average amount of mutual information calculated by pulse wave signals and body movements measured non-invasively by the

pneumatic method. As a result, the root mean square error between the appearance rate of delta wave occurrences measured with a polysomnography and the estimated delta pulse was 14.93%.

栗原陽介・小山兼司・渡辺嘉二郎・田中　博 :「在宅介護におけるFIM値推定法-仰臥位から端在への起き上がり動作-」, 人間工学, Vol.44, No.2, pp.76‐81, 2008.4

In Japan, 1.4 million patients currently suffer from paralysis due to impairments to blood vessels in the brain. In order to prevent them from being bed-ridden and to enable them to lead an independent daily life, significant of recovering their abilities in keeping the balance while standing and in walking by their own feet has been significant, and many research activities have been focused to evaluate these abilities. However, there have been few that focus on the bodily motion in sitting up on the bed, although every patient must follow this step before going into the standing position. In this research, the sitting up motions were measured by gyro sensors to obtain parameters to construct a system for quantitatively evaluating the posture changes and estimate FIM.

石井　亮, 中野有紀子 :「ユーザの注視行動に基づく会話参加態度の推定–会話エージェントにおける適応的会話制御に向けて－」, 情報処理学会論文誌, Vol.49, No.12, pp. 3835-3846, 2008

対面会話において，聞き手が関心を持って会話に参加していることを，話し手は聞き手の動作や視線から察知し，積極的に参加していない様子であれば話題を変えるなど，会話の内容や方略を調整している。このような適応的な会話制御が可能な会話エージェントを目指し，本研究では，ユーザの注視行動から対話への参加態度を推定する機構を提案・実装する。まず，Wizard-of-Oz 法により，ユーザの視線行動の計測データ，会話への関心低下に関するユーザの内観と他者の観察，発話情報を収集する。次に，ユーザの注視行動を分析し，理想的な会話参加態度から逸脱している視線遷移パターンを同定する。さらに，エージェントとの会話中にリアルタイムに取得される視線データから，個人差を考慮しながら逸脱度の高い状態を検出することができる個人適応型会話参加態度推定アルゴリズムを提案し, これを，視線計測装置を統合した会話参加態度推定機構として実装する。最後に，評価実験から，個人適用型アルゴリズムの有用性，ならびにユーザの会話参加態度に応じてエージェントが振る舞いを変化させることのインタラクションにおける効果を示す。

榎本美香，中野有紀子 :「人－人，人－ヒューマンエージェントの社会的インタラクションにおける言語・非言語行為の配置規則」, 日本知能情報ファジィ学会誌, Vol.20, No.4, pp.540-556, 2008.

本研究では，人－人と人－エージェントのインタラクション方略に違いがあることを示し，人間の行動モデルに基づいたエージェントを実装する際に考慮すべき観点を提案する。ここでは，パソコン操作課題における人－人，人－エージェントの対話を素材として，どのように言語・非言語行為がインタラクションの中で使用されているかを分析し，エージェントの実装に利用可能な方略を明らかにする。まず，人－人と人－エージェント対話の基礎的特徴を観察し，人－エージェントの対話では人の発話量が少なく，相づちや応答が稀にしか差し挟まれないことを示す。次に，非言語行為を含めた人－人の行為の配置規則を定式化し，人－エージェントのインタラクションにおいてこの規則がどのように破られるかを示し，この違反が，相づちや応答の変わりに，相手発話への理解を示すためになされた補償的行為であることを示す。

Hung-Hsuan Huang, Kateryna Tarasenko, Toyoaki Nishida, Aleksandra Cerekovic, Vjekoslav Levacic, Goranka Zoric, Igor S. Pandzic, and Yukiko Nakano : "*An Agent Based Multicultural Tour Guide System with Nonverbal User Interface", the International Journal on Multimodal Interfaces*, Vol.1 No.1, pp 41-48, Springer Press, April 2008

邦文題目：非言語ユーザインタフェースを伴う複数文化対応型旅行案内エージェントシステム

The advancement of traffic and computer networks makes the world more and more internationalized and increases the frequency of communications between people who speak different languages and show different nonverbal behaviors. To improve the communication of embodied

conversational agent (ECA) systems with their human users, the importance of their capability to cover cultural differences emerged. Various excellent ECA systems are developed and proposed previously, however, the cross-culture communication issues are seldom addressed by researchers. This paper describes a short-term project aiming to explore the possibility of rapidly building multicultural and the multimodal ECA interfaces for a tour guide system by using a generic framework connecting their functional blocks.

大宮康宏・寅市和男・村上仁己：「ネットワーク上の協調作業を支援する大判印刷物制作システム」, 印刷学会論文誌，pp36-45，第45巻3号, June 2008

大型印刷を可能とする，印刷所と発注者を効率的にネットワーク化する方式ｔその実験結果についての報告。

川崎秀二・片岸一起・寅市和男・村上仁己：「急峻な遮断特性を持つフルエンシーFIRフィルタ設計法，－ハードウェア最小化を目指して－」，電気学会論文誌，Vol. 129-C, No. 3, pp406-417, 3月号，2009

最近の音声，画像のデジタル化時代では，以下に高品質に波形近似しつつ，計算量を最小化する，波形近似法が極めて重要になってきている。本論文では，フルエンシー技術に基ずき，従来方式に比べ，1/3の計算量で，s/nが90db以上の特性を実現する方式を紹介。

K. KATAGISHI, K. IKEDA, M. NAKAMURA, K. TORAICHI, Y. OHMIYA and H. MURAKAMI : “Quadratic Fluency DA Functions as Non-uniform Sampling Functions for Interpolating Sampled-values”, World Scientific and Engineering Academy and Society, Issue 1, Vol. 8, pp125-135, January 2009

邦文題目：サンプル信号内挿のための非線形標本化DA変換方式

非等間隔サンプル信号にたいする、高品質DA変換方式の紹介。フルエンシー技術wp採用することで，目標を実現。

M. HIGUCHI, S. KAWASAKI, K. KATAGISHI, M. NAKAMURA, K. TORAICHI, H. MURAKAMI and Y. OHMIYA : “A Design Method of Narrow Band FIR Filters Based on Fluency Sampling Function”, World Scientific and Engineering Academy and Society, Vol.9, pp345-366，January 2009

邦文題目：フルエンシー技術に基づく狭帯域FIRフィルタの作成法

フルエンシー近似法に基つき、狭帯域デジタルフィルタの設計法の提案。従来のフーリエ方式に比べ，90dB以上の特性実現を，1/3以下の計算量で実現。

Y. Ohmiya, M. Nakamura, K. Katagisi, Y. Morooka, K. Toraichi, H. Murakami : “Scalable and High-Precision Function-Approximated Images and Its Secure Coding”, World Scientific and Engineering academy and Society, Transactions on Communications, Issue 9, Vol. 7, pp.954-963, September 2008

邦文題目：スケーラブル高精度近似画像とその秘匿符号化

フルエンシー技術を応用して，高精度・スケーラブル画像近似法を開発し，その技術の有効性を紹介するとともに，画像秘匿法への応用も具体的に示した。

筧　宗徳・山田哲男・渡邉一衛：「部品表の概念を用いた授業情報の構造化と授業設計」日本eラーニング学会論文誌, Vol.8, pp.4-14, 2008.5

eラーニングによる授業では，様々な教育方法や教育手段が存在するため，担当教員が単独で授業の設計・開発を行うことが難しい。本研究では，普及しつつある授業設計のプロセスの手法であるインストラクショナルデザインの考え方をベースに，製造業における製品ライフサイクルマネジメント(PLM: Production Life-Cycle Management)と，製品設計，生産設計で利用されている部品表(BOM：Bill Of Materials)の概念を用い，授業設計・開発に適用することを試みる。

筧　宗徳・玉木欽也・渡邉一衛：「eラーニングによる協働型仮想業務体験実習の授業設計と実施」私立大学情報教育協会論文誌, Vol.11, No.1 pp31-35,2008.11

これまでの大学教育では，経営戦略，生産管理の分野において，知識・理論の習得を目的とした講義が中心であった。技法・手法の理解と問題発見・解決などの応用能力には，実業務を通じて理解が重要

となる。大学教育では，体系的に業務全体を把握し，複雑な実業務を体験するのは困難である。本授業は，シミュレーション技術と，協調学習による教育方法を 提案し，仮想企業を設定し，実業務をモデル化し，仮想業務を体験しながら技法・手法を学び問題発見・解決能力を習得することが可能となった。

筧　宗徳・山田哲男・八木英一郎・渡邉一衛・鈴木潤平・玉木欽也，「エンジニアリング・プロセスにおける目的別BOMの構築」国際プロジェクト・プログラムマネジメント学会論文誌, Vol.3,No.1, pp31-40, 2008.12

新製品開発におけるエンジニアリング・プロセスは，近年より迅速化が求められたプログラム・マネジメントと変化しつつある。このエンジニアリング・プロ セスおいて，各業務プロセスの目的に応じた部品表（BOM；Bill of Materials）の構築により，業務情報の共有化が行える。本研究では，エンジニアリング・プロセスの目的別BOM構築についてBOMの設計方法を提案し，ケーススタディを通じたプロセス検証を行った。初めに，製造BOMやワークステーションBOMなど目的別BOMと各業務プロセスを説明する。次に，目的別BOMの設計方法を提案し，最後に，自動販売機のケーススタディを取り上げ，BOM設計例を示してプロセス検証を行う。

エレクトロメカニクス学科

Akira Ninomiya, Daisuke Uematsu, and Takeshi Ishigohka：“An Experimental Study on Decay Characteristics of Magnetized Flux in YBCO-QMG Bulk Material Under AC Magnetic Field”, IEEE Trans. On Applied Superconductivity, Vol.18, No.2, pp1362-1365, 2008.6

邦文題目：交流磁界下におけるYBCO-QMGバルク超伝導体内の着磁磁束の減衰特性に関する実験的検討

We have examined the decay characteristics of magnetized flux in an YBCO-QMG bulk material in a weak AC magnetic field with a magnitude around the lower critical magnetic field. The frequency of the applied magnetic field is 50Hz. The magnetic field is applied in two directions that are parallel and perpendicular to the direction of the original magnetization field which corresponds to the C-axis of the YBCO bulk. The measurements of the magnetized flux decay are performed for one hour. The experimental result shows that the decay of the magnetic flux depends greatly on the direction of the applied external AC magnetic field. According to our experiment, the decay of the magnetized flux for the perpendicular direction AC magnetic field is about two times larger to that for the parallel direction.

石郷岡猛・二ノ宮晃・中山俊介：「ラバー磁石製円形軌道上の高温超電導バルク体の簡易浮上・推進装置の試作」成蹊大学理工学研究報告，Vol.45, No,1, pp1-4, 2008.6

The authors have studied a simple and easy-to-make superconducting magnetic levitation and propulsion system. It is composed of bulk HTS(High Temperature Superconductor) and circular track made by rubber magnets. The HTS bulk is put in a light weight container made of styrofoam. Rubber magnets are commercially available low price ones. The levitator is propelled electromagnetically by on-ground coils fed by charged capacitor. The system would be one of the most simple and low-cost systems as a first-step demonstration model of superconducting magnetic levitation systems.

石郷岡猛・二ノ宮晃・近藤祐一・深野翔平：「多数並列MOSFETを用いた低温用直流電源と超伝導コイルの充・放電実験」成蹊大学理工学部研究報告，Vol.45, No.2, pp55-59，2008.12

The authors have proposed a cryogenic low-voltage/high-current DC power source using multi-parallel-connected MOSFERs as an excitation power source of superconducting coils. It has been confirmed that the power source can operate at 77K in liquid nitrogen bath. The fundamental idea and experimental results are presented. The experiment using 200 MOSFETs connected in parallel are carried out. The forward-direction voltage drop at 77K has been measured. The excitation current of the superconducting coil can be increased and decreased arbitrarily. The experi-

mental results show good prospect of this type of DC power source not only for the excitation of superconducting coils but also for the forced discharging of the coils.

小方博之・山本紗恵子：「動作時系列データからのスキルの自動評価の一試み」，日本テスト学会誌, Vol. 4, No. 1, pp. 65-72, 2008.5

Though performance testing is an effective way to assess examinees' skill in sports or manufacturing, its CBT implementation is not progressing. Taking golf putt swing as an example, this paper discusses a method to assess the skill level of an examinee automatically from his motion data. In our previous paper, we used some characteristic postures extracted from the motion data for assessment. However, this method cannot take the timing of motion or the process between the postures into account. Here, we propose using a recurrent neural network (RNN) to deal with this problem. We applied the quasi-Newton method to accelerate the learning process, and the minimum description length principle to decide the network configuration. We verified the effectiveness of the proposed method by using actual examinees' motion data and assess their skill with RNN.

小方博之・山本紗恵子：「リカレントニューラルネットワークによるパタースイングスキルの自動評価」, 精密工学会誌, Vol. 74, No. 11, pp. 1210-1214, 2008.11

The progress of information technology and the popularization of the personal computer brought the growth of computer-based testing (CBT), which utilizes computer to hold an exam and rate examinees. Most of the current CBT can be regarded as an extension of the paper-and-pencil exam, and aim to assess the knowledge or the achievement of the examinees. On the other hand, very few CBT systems address assessing examinees' skill in sports or manufacturing.

This paper discusses a method to evaluate examinees' physical skill from their motion data, taking golf putt swing as an example. The motion data is generally represented as a vector time series. The recurrent neural network is introduced to deal with such data. We verified the effectiveness of the proposed method by collecting actual examinees' motion data and assess them using the proposed method.

Hiroyuki Ogata and Saeko Yamamoto : "Estimating Sports Performance Using Recurrent Neural Network", New Trends in Psychometrics, Universal Academy Press, pp. 371-376, 2008

邦文題目：リカレントニューラルネットワークを用いたスポーツのパフォーマンス評価

This research addresses to a method to assess examinees' skill from items of which response type is a vector time series. Such response can be seen for example in performance testing like sports or manufacturing. In this paper, we propose using recurrent neural network to deal with this problem. We verified the effect of the proposed method by obtaining examinees' data using motion capture device and calculating their skill level using the recurrent neural network.

村松大吾・厳　維娜・松本　隆：「ヒルクライミング法を用いた攻撃に強いオンライン署名認証アルゴリズム」, 電子情報通信学会論文誌A, Vol. J91-A, No.10, pp.983-988, 2008.10

オンライン署名認証の脆弱性の一つとしてヒルクライミング法を用いた攻撃が指摘されている。本論文ではこの攻撃に強い認証アルゴリズムとして攻撃に利用されるヒルクライミング法を逆に認証システムに利用する手法を検討し，その初期実験結果を報告する。

窪田　悟, 岸本和之, 植木　俊, 山根康邦：「液晶ディスプレイに要求される黒レベルの輝度」, 映像情報メディア学会誌, 63巻, 3号, pp.349-354, 2009.3

This paper describes two experiments that were conducted to evaluate the required luminance of the black level on liquid crystal displays (LCDs) as a function of the average luminance of a displayed image, the screen illuminance, and angular screen size. In the first experiment, 18 subjects adjusted the luminance level of the black region of various still video images, which had different average luminance levels, until they

perceived them as black. The results revealed that the required luminance of the black level of an LCD as a function of the average luminance of a displayed image corresponds to the following formula: $BL1 = 0.137 \times AL^{0.46}$. $BL1$ is the luminance of the level perceived as black, and AL is the average luminance of the displayed image. In the second experiment, 22 subjects adjusted the luminance of a black region embedded in the center of a screen with uniform luminance, under different screen illuminance levels and angular screen sizes, until they perceived it as black. The results revealed that the required luminance of the black level of an LCD as a function of the screen illuminance and background luminance of the black region corresponds to the following formula: $\log BL2 = 0.44 \log Ei + 0.62 \log Lbg - 1.8$. $BL2$ is the luminance of the level perceived as black, Ei is the screen illuminance level, and Lbg is the background luminance of the black region. The angular size of the screen did not influence the required luminance of the black level of the LCDs.

窪田　悟, 羽原　亮, 中村芳知, 野本弘平, 山川正樹 :「画像の平均輝度レベル，観視者の年齢，照明環境を考慮した液晶ディスプレイの輝度制御」, 映像情報メディア学会誌，62巻，6号，pp. 931-936，2008.6

We investigated what influences the average luminance level (ALL) of displayed images, screen illuminance, and viewers ages had on the preferred luminance of LCDs. Twenty young subjects (mean age: 21.8) and 24 seniors (mean age: 68.9) adjusted the luminance of a 17-inch 1000: 1 LCD monitor to their preferred levels under different experimental conditions. The results indicate that the preferred luminance of LCDs corresponded to the following formula: $Lp = k \times ALL^{\alpha}$. This is where Lp is the peak white luminance of the LCDs, k is a constant, and ALL is the average luminance level of the displayed images. Here, α is a constant from -0.19 to -0.20 for the seniors and from -0.14 to -0.17 for the young subjects. The influences of age-related changes in vision and ambient lighting on the luminance requirements for LCDs are also discussed. These results can be applied to the design of luminance-control systems for LCDs.

成田昌平・幸畑隼人・齋藤洋司 :「プラズマレスエッチングにより形成したグルーブ状およびハニカム状テクスチャー構造シリコン太陽電池の特性」，材料の科学と工学 vol. 46, No.1, pp. 38-41，2009.2

Reflection loss of silicon solar cells can be reduced by texturization of the surfaces. In this study, crystalline silicon substrates were treated with cholorine trifluoride (ClF_3) to create the groove- and honeycomb-textured structures. We mainly investigated optical and electrical properties of the textured surfaces. By the treatment with ClF_3 gas, the reflectance of the groove- and honeycomb-textured surfaces were obtained to be about 17% and 21%, respectively, at the wavelengths of 600nm. The solar cells using the textured substrates were fabricated and their performance was evaluated.

宮内良彰・齋藤洋司 :「ゾル・ゲル法により作製したタンタル添加酸化バナジウム膜の電気的特性」, 電子情報通信学会論文誌 C, vol.J91-C, No.10, pp.498-499, 2008.10

二酸化バナジウム(VO_2)は68℃において相転移による抵抗率が急変することが知られ，また抵抗率も比較的低いことから，ボロメータ用検出部材料として実用化されている。しかし，相転移温度が室温よりかなり高いこと，温度履歴によるヒステリシスを生じることなどの問題点がある。本研究では，ゾル-ゲル法を用いて$V_{1-x}Ta_xO_y$膜の作製を行い，抵抗の温度係数（TCR）の大きさを維持し，ヒステリシスの増大を抑えつつ相転移温度の低温側へのシフトを試みた。その結果，酸化バナジウム膜にタンタルを添加することにより，ヒステリシスの減少および相転移温度の低下を実現できた。TCRの減少を抑制するための還元条件の最適化とボロメータに用いた場合の性能評価が今後の課題である。

Takashi SAKAI, Shinzo KASAI and Koji YAMAMOTO : "Quantitative Analysis on Macro-Fluctuation of Several Bowls by Laser Microscope and FFT", Journal of Optoelectronics and Advanced Materials, Rapid Communications,Vol. 3, No. 3, pp. 210-214, Mar

2009
邦文題目：「レーザ変位計とFFT解析による巨視的な陶器表面性状の定量的評価」

In recent years, the expression “healing”, represented by 1/f fluctuations is frequently used. Most typically classical music, along with light, patterns, heat, wind, and shape comfort humans. This is because biological rhythms of physiological actions such as cardiac beats and alpha brain waves have 1/f wavelengths like these fluctuations.

On the other hand, in the scene of metalworking, productivity and efficiency are of greatest importance. As a result, products with “warmth” and “taste” by skilled craftsman’s handwork are being crowded out, along with technical problems. There are some trials of expert systems, which incorporate masters’ works by skilled craftsmen into control programs for machinery. However, they have not been put into practical use yet, and additional studies from other aspects are needed.

Against such a background, this study particularly addresses healing and fluctuation according to the surface properties of a solid. Our ultimate goal is to establish technology that transfers this fluctuation on die forging surfaces or machinery structure surfaces. Die forgings are manufactured in a mass-production line. Therefore, only efficiency has been considered as important in their design and production. Products manufactured using this transfer technology will have extra value of a peculiar healing effect. Such products will provide healing effects to workers also during manufacturing processes, as well as to consumers.

This report addresses macroscopic surface properties of pottery by a famous potter, a masterpiece of fluctuation and healing, and discusses its quantitative evaluation including fractal dimension D using Fractal geometry conducted as the first stage. Specifically, we have aimed at obtaining quantitative data of effective healing components towards future transfer technology establishment by means of quantitative evaluation using fractal dimension D for surface properties. It is no imitation or pastiche of fluctuation and healing of pottery by a famous potter: this healing component is evaluated quantitatively using fractal dimensions, and transfer technology is established based on these quantitative data. This is the most important characteristic of the contribution made by this study.

酒井　孝・笠井信三・山本耕治：「巨視的領域における陶器表面性状の定量的評価－付加価値を有する転写技術の確立　第一報－」, 塑性と加工, 第50巻, 第576号, pp. 44-48, 2009.1

In order to evaluate the relaxation and surface irregularity of the famous artist’s bowl and other analytical objects, an analytical procedure was developed by applying the concept of fractals, a hyperbola model of the Richardson effect, and FFT analysis. The main results of this study are summarized as follows: (1) To evaluate the irregular surface of relaxation quantitatively, an analytical system using a high-resolution laser sensor was developed, and an analytical-procedure-developed mesh method was established. (2) It was found that the famous artist’s bowl has a fractal nature and a relative self-similarity in wide resolution ranges. (3) The geometrical irregularity of the surface can be effectively evaluated by combining the fractal dimension D and the FFT parameters. (4) In order to apply the design of a mechanical structure in a later study, the target value of the fractal dimension was estimated as D=2.4.

Takashi SAKAI, Shinzo KASAI and Koji YAMAMOTO：“Quantitative Analysis on Micro-Fluctuation of Several Bowls by Scanning Laser Microscope”, Journal of Optoelectronics and Advanced Materials, Rapid Communications, Vol.3, No.1, pp.69-74, Jan 2009
邦文題目：「走査型レーザ顕微鏡による微視的な陶器表面性状の定量的評価」

Relaxation, fluctuation and surface irregularities of a famous potter’s bowl and other objects were evaluated with an analytical procedure developed by applying fractal concepts and the

Richardson effect. Important results of this study can be summarized as follows. (1) An analytical system using a scanning laser microscope system was developed to evaluate the irregular surface of fluctuations quantitatively; an analytical procedure to develop the Mesh method was established. (2) Irregular surfaces in micro areas of the analyzed objects have a fractal nature: (a) the famous potter's bowl, (b) the original handmade bowl, (c) the original handmade coffee cup, and (d) the Black teacup. (3) The famous potter's bowl has a fractal nature and relative self-similarity over wide analytical ranges. (4) Fractal dimensions and the nature of relaxation were connected as D=2.4. This value is useful for application to the design of a mechanical structure in later studies.

Tsuyoshi FURUSHIMA, Ken-ichi MANABE and Takashi SAKAI : "Fabrication of Superplastic Microtubes Using Drawing Process", Materials Transaction,Vol. 49, No. 6, pp. 1365-1371, Jun 2008

邦文題目：「超塑性ダイレス引抜きによるマイクロチューブの創成実験」

Microtube is commonly used and required, particularly as micro components in micro-system technologies (MST) and micro electro-mechanical systems (MEMS). In this paper, fabrication process of microtube using superplastic dieless tube drawing was studied experimentally. Superplastic material used is Al-78Zn alloy tube with outer diameter of 2 mm and wall thickness of 0.5 mm. A high-frequency induction heating apparatus with air cooling nozzle was used for the dieless drawing. In the experiment of single pass dieless drawing, the effect of drawing conditions such as forming temperature, distance between heater and cooler and tensile speed on deformation profile, was clarified. Furthermore, in three-pass dieless drawing, a microtube with outer and inner diameters of 343μm and 161μm respectively can be fabricated successfully. In addition, from the experimental results and fundamental principles, it is confirmed that the ratio of inner to outer tube diameters maintains a constant value during dieless drawing. In other words, the geometrical similarity with the minimization of dimension is satisfied in this process. Finally, it is found that the surface roughness of microtube maintains a constant value in the dieless drawing process.

酒井　孝:「微細結晶粒純アルミニウムの組織制御による塑性加工性向上へのアプローチ」, 天田金属加工機械技術振興財団研究概要報告書（20），pp. 15-18，2008.4

金属材料を合金化せずに強ひずみ加工を施すことで，リサイクル性や強度，耐食性に優れた「スーパーメタル」が創製される。最近は1μm以下の結晶粒径を持つ高強度スーパーメタルも開発されており，これを広範な産業分野へ応用することでさらなる軽量化が実現され，燃費向上による省エネルギー化や二酸化炭素放出量の低減に寄与することとなる。

このスーパーメタルは，純金属の組織を均一に超微細粒に制御することで，微細化を促進する合金元素を大量に添加することなくHall-Petch則に従い高強度化が実現できる。これは高強度だけでなく高延性も実現するため，塑性加工における被加工材として大きな可能性を持っていると考えられる。しかしながら，その加工特性については全く不明であり，この材料が市場に流通する以前に十分な特性を把握する必要がある。

金属材料の微視的な特性に着目した場合，SEM-EBSD結晶方位解析システムの普及により結晶粒に関する情報は安易かつ飛躍的に増量した。しかしながら，金属組織学を専門とする研究者が大量の結晶方位データを保有する一方，これとは独立して塑性加工学の分野ではマクロな変形や加工性について研究しているのが現状である。これは決して連携が取れているとは言えず，金属組織学における材料の微視的な変形特性を積極的に塑性加工の分野にも取り入れるべきと考える。

本研究では先駆的にスーパーメタルの加工特性を調べるとともに，塑性変形時の各応力状態を十分に考慮し，微視的な結晶構造を制御することで飛躍的に加工性を向上させた金属材料の創製技術確立を最終目的とする。このような全体計画のうち，本申請では特に以下の2点について重点的に研究を進める。

スーパーメタルに代表される強ひずみ加工を施した微細結晶粒材に関しては，今日まで市場に流通しているものと材料特性が全く異なるために，塑性加工時における様々な応力状態や変形挙動，ならびに

加工限界などが異なる。そこで，これまで国内外で研究対象とされてきた様々なひずみ負荷様式下で強ひずみ加工された微細結晶粒材に対する塑性加工特性について調査する。

材料の塑性変形性を飛躍的に向上させるためには，材料の微視的挙動を把握した上で，各部位の応力状態を考慮した材料設計が不可欠である。すなわち，「適材適所」なる考え方を当該分野に応用した「適組織適所」を実行する上で，結晶方位に代表される結晶データとそれに対応する機械的性質に関する基礎データを蓄積する。またこれをデータベース化して本研究における様々な箇所に応用する。

このような全体計画において，本研究では，各種冷間強ひずみ加工によって結晶粒微細化された純アルミニウムの単結晶材の曲げ加工にともなう結晶方位の変化をSEM-EBSD解析から調査し，微細結晶粒材の特異な曲げ加工特性に関して考察を加えた。また，純アルミニウムを中心として広範な材料に対する結果の比較も行った。

N. Oda, M. Ito and M. Shibata：“Vision-based motion control for robotic systems”, Transaction on Electrical and Electronic Engineering, Vol.4, No.2, pp.176 - 183, 2009.2

邦文題目：ロボットシステムに対する視覚に基づくモーションコントロール

The paper presents recent advances of vision-based motion control for robotic systems. The visual feedback loop is very effective for increasing the dexterity and flexibility of robot's task. With the development of vision and computer technology, the visual feedback applications are remarkably expanded for various robotic systems. In the paper, at first, a variety of vision-based approaches in Japan are overviewed from the viewpoint of motion control scheme, and fundamental formulations of visual servo controller are described. And two kinds of visual feedback applications are introduced with several experimental evaluations. The first one is non-delayed visual tracking approach using active stereo vision. It is found that the target motion estimation is an important issue for fast tracking. The other is the motion controller for wheelchair-type mobile robots based on optical flow field. The vision-based feedback controller conducts the force-related motion. Then, the vision makes dynamic environmental change transmitted to human operator through force interaction. The validity of these approaches are evaluated by experimental results.

Sung-Hwan Shin, Jeong-Guon Ih, T. Hashimoto and S. Hatano：“Sound quality evaluation of the booming sensation for passenger cars”, Applied Acoustics vol.70, pp.309-320, 2009.2

邦文題目：乗用車車内音のこもり感についての音質評価

Automotive booming noise due to powertrain occurs when pure or narrow band tones related to the firing frequency of engine and its harmonics excite the passenger cavity, which entails a prominent increase of sound intensity. The booming sensation has been considered as very important to the acoustic comfort of passengers. In this study, a sound quality index which can objectively evaluate the booming sensation was derived. Because of the tonal nature of powertrain booming noise, subjective pitch was employed to find only aurally relevant tonal components which influence the booming sensation as well as the loudness of the sound in question. Using the empirical data and the frequency difference limen for just-noticeable change of booming sensation obtained from the listening test, an existing pitch extraction algorithm was modified. The modified pitch model was applied to the interior noises of accelerating passenger cars together with the loudness analysis for representing the objective feature of booming feeling. Subjective tests using the magnitude estimation method were conducted for booming sensation using varions booming sounds. Finally, booming strength was proposed for quantifying the booming sensation, which was validated by subjective results. The correlation coefficient between the derived booming strength and the booming sensation was as high as 0.926.

K. Tanaka, K. Kohayakawa, S. Iwata, and T. Irie：“Application of 2-Pyridyl Substituted Hemithioindigo as a Molecular Switch in Hydrogen Bonded Porphyrins”, J. Org. Chem., Vol. 73, No. 10, pp. 3768-3774, 2008. 5

邦文題目：2-ピリジル置換したヘミチオインジゴの水素結合ポルフィリン系での分子スイッチとしての応用

When the photochromism of 2-(3'-pyridylmethylene)-7-ethylbenzo[b]thiophen-3(2H)-ones (1) was investigated, the high thermal stability of the *E* isomer of 1, 1 *(E)*, and good repeatability of the photoinduced *E*, *Z*-isomerization were found. Association constants of the 1:1 complexations of 1*(Z)* and 1*(E)* with the ureidoporphyrin 2 and with the pentafluorobenzamidoporphyrin 3 were evaluated. We found that 2 captures 1*(E)* preferentially to 1*(Z)* and, reversely, 3 prefers 1*(Z)* to 1*(E)*. Based on these differences in the binding ability, we concluded that the repeatable movement of the hemithioindigo, so-called the hemithioindigo shuttle, between two kinds of porphyrins was controlled by the photoirradiation. These movements were applied to create a molecular switch for changes in the quinone distribution between two kinds of porphyrins.

武藤健一郎・清水　裕：「アイマークレコーダーによる剣道審判の視線研究:しかけていく技の判定をとおして」, 武道学研究，第41巻　第２号，pp1-11，2009.2

In this research, we take note of Kendo referee's viewpoints. The purpose is to make clear the viewpoints of the subjects with different skills when judging the match close to the real one, and to obtain suggestions to improve the skill of the referee. By using the Eye-mark Recorder, we did the test to judge the match projected on the big screen. Picking up the “Shikaketeiku-waza” from test, we tried to understand how they are using their viewpoints. Comparing the subjects with different skills and viewpoints towards the process of “datotsu”, we got the following.

(1) Who have higher skill put their Viewpoints on the center zone of the player at any time, and don't change at all during the process of moving.

(2) Who have higher skill put their viewpoints into space, and won't get interrupted much by other things.