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PART I ANNUAL REPORTS

1. Abstracts of Papers Published in Journals

MATHEMATICS

Factorization of Elements in Classical Groups into a Product of Involutions

H. Ishibashi
International Journal of Pure and Applied Mathematics, **41** (4), 499–504 (2007)

We discuss factorizations of elements in various algebraic systems, say, parmutation groups, matrix groups, orthogonal groups, etc. into a product of involutions, where an involution is an element of order two. Also, we treat Djocovićs' involution theorem for linear automorphisms of a vector space.

Fuzzy Multi-Criteria Minimum Spanning Tree Problem

Xin Gao*[1] and Kazuko Iwamura (*1 Tsinghua University, Beijing, China)
Josai Information Sciences Researches, **17**, 1–11 (2007)

In this paper, a fuzzy multi-criteria minimum spanning tree problem is formulated as expected minimum spanning tree model. α–minimum spanning tree model and the most minimum spanning tree model according to different decision criteria. Then, the crisp equivalents are derived when the fuzzy costs are characterized by triangular fuzzy numbers. Furthermore, a simulation-based genetic algorithm using Prüfer number representation is designed. Finally, a numerical example is given to illustrate the effectiveness of the algorithm.

New models for shortest path problem with fuzzy arc lengths

X. Ji*[1], K. Iwamura and Z. Shao*[2] (*1 Tsinghua University Beijing, *2 Graduate School of the Chinese Academy of Sciences, Beijing, China)
Applied Mathematical Modelling, **31**, 259–269 (2007)

This paper considers the shortest path problem with fuzzy arc lengths. According to different decision criteria, the concepts of expected shortest path, α–shortest path and the most shortest path in fuzzy environment are originally proposed, and three types of models are formulated. In order to solve these models, a hybrid intelligent algorithm integrating simulation and genetic algorithm is provided and some numerous examples are given to illustrate its effectiveness.

CHEMISTRY

Porphine Dimeric Assemblies in Organic-Pillared Coordination Cages

K. Ono*1, M. Yoshizawa*1, T. Kato, K. Watanabe*1 and M. Fujita*1 (*1 Department of Applied Chemistry, Graduate School of Engineering, The University of Tokyo)
Angew. Chem. Int. Ed. Engl., **46**, 1803–1806 (2007)

The promising method, which we focus on here, is to utilize host-guest π–stacking interactions, where any direct modifications on the porphine core are not required. We report the assembly of porphine dimers in the boxshaped cavity of organic-pillared cages. Depending on the cavity size, two porphine molecules are stacked directly or layered with an aromatic spacer. They exhibit unique UV/Vis absorption and ESR spectra (when the porphine guest contains CuⅡ), depending on the manner of stacking in the cavity.

Manipulating the Through-Space Spin-Spin Interaction of Organic Radicals in the Confined Cavity of a Self-Assembled Cage

K. Nakabayashi*1, M. Kawano*1, T. Kato, K. Furukawa*2, S.-i. Ohkoshi*3, T. Hozumi*3 and M. Fujita*1 (*1 Department of Applied Chemistry, Graduate School of Engineering, The University of Tokyo, *2 Institute for Molecular Science, *3 Department of Chemistry, Graduate School of Science, The University of Tokyo)
Chem. Asian J., **2**, 164–170 (2007)

We show a new approach to manipulating the through-space spin-spin interaction by utilizing the confined cavity of a self-assembled cage. The coordination cage readily encapsulates stable organic radicals in solution, which brings the spin centers of the radicals closer to each other. In sharp contrast to the fact that the radical in solution in the absence of the cage is in a doublet state, in the presence of the cage through-space spin-spin interaction is induced through cage-encapsulation effects in solution as well as in the solid state, resulting in the triplet state of the complex. These results were confirmed by ESR spectroscopy and X-ray crystallography. The quantity of triplet species generated by encapsulation in the cage increases with increasing affinity of the radicals to the cage.

Metal dimer and trimer within spherical carbon cage

T. Kato
Journal of Molecular Structure, **838**, 84–88 (2007)

The C_{80} fulleren cage can be used to realize confinement with the highest possible icosahedral (Ih) symmetry. $La_2@C_{80}$ and $Sc_3C_2@C_{80}$ are molecules in which metal dimer and trimer are encapsulated within the C_{80} cage. They are recently purified in the substan-

tial amount by using a high performance liquid chromatograph (HPLC), and studied by spectroscopy and X-ray diffraction. The confinement of the metal cluster with the high symmetry (Ih) cage is reflected in their specific potential of the intra-molecular rotation for the cluster. The result of electron spin resonance (ESR) measurements indicates that the intra-molecular potential is modified by the chemical modification of the C_{80} cage as well as by the injection of an excess electron.

The Poly(Radical Cation) of a Star-Shaped Oligoarylamine-Detection of Excited High-Spin States

Y. Hirao*1, H. Ishizaki*1, A. Ito*1, T. Kato and K. Tanaka*1 (*1 Department of Molecular Engineering, Graduate School of Engineering, Kyoto University)
Eur. J. Org. Chem., **207**, (1), 186–190 (2007)

The intra-molecular spin-spin interaction in the highly oxidized species of a star-shaped oligoarylamine, hexakis{4-[bis(*p*-methoxyphenyl)amino]phenyl}benzene, in which six diphenylamine units are introduced as redoxactive sites into a central hexaphenylbenzene core, has been investigated by EPR spectroscopy. The hexacation-rich sample was prepared by chemical oxidation with 7.5 equivalents of [bis(trifluoroacetoxy)-iodo]benzene (PIFA) in the presence of trifluoroacetic acid (TFA) in dichloromethane at 195 K. Variable-temperature EPR measurements provided the non-Curie temperature dependence of the signal intensity. The fine structure of the EPR spectrum also varies with temperature. In order to identify the spin multiplicity of the generated poly(radical cation), we carried out electron spin transient nutation measurements based on pulsed EPR spectroscopy at various temperatures. From the spectra, it was found that the high-spin states are thermally populated with increasing temperature. These results indicate the low-spin ground state of the poly(radical cation).

Structural Details of Fowl Feather as Revealed by Polarized Raman Microspectroscopy

Yoshiko Yokote, Yoshiko Kubo*1, Rieko Takahashi, Teruki Ikeda*1, Kiso Akahane and Masamichi Tsuboi*2 (*1 JASCO, Hachioji, Tokyo, 193–0943, Japan, *2 Department of Science and Engineering, Iwaki-Meisei University, Chuodai-Iino 5–5–1, Iwaki, Fukushima 970–8551, Japan)
Bull. Chem. Soc. Jpn., **80**, 1148–1156 (2007)

Raman spectra of undeuterated and deuterated rachis from a fowl feather was observed with 488 nm excitation in the 400–1800 cm^{-1} region. Fowl feather rachis and barbs were subjected to a polarized Raman microscopic examination with excitation at 785 nm. From the observed frequencies, intensities, and scattering anisotropies of the 20 Raman bands, and on the basis of known Raman tensors of the 10 localized molecular vibrations, conformations, and orientations of the polypeptide main chains, tyrosine, phenylanine,

tryptophan residues, and disulfide linkages of the protein molecules in the feather were elucidated.

Effect of Saliva, Epigallocatechin Gallate and Hypoxia on Cu-induced Oxidation and Cytotoxicity

Takashi Yamazaki*1, Atsushi Yamazaki*2, Hiroyuki Onuki*1, Yasushi Hibino*2, Yoshiko Yokote, Hiroshi Sakagami*3, Hiroshi Nakajima*2 and Jun Shimada*1 (*1 Division of Oral Maxillofacial Surgery and *3 Division of Pharmacologv, Department of Diagnostic and Therapeutic Sciences, *2 Division of Dental Biomaterials Sciences, Department of Restorative and Biomaterials Sciences, Meikai University School of Dentistry, Sakado, Saitama, Japan)
In vivo, **21**, 603-608 (2007)

We have previously reported that contact with copper (Cu) induced immediate cell death via an oxidation-involved mechanism in human promyelocytic leukemic HL-60 cells, whereas contact with other metals (Au, Ag, Pd) produced no discernible effect. In the present study, we investigated the conditions under which Cu-induced oxidative stress can be reduced. Contact with a Cu plate in the absence of cells enhanced the rate of consumption of cystine to the greatest extent, followed by that of methionine and histidine. Under hypoxic conditions, the consumption of all these amino acids was significantly reduced. On the other hand, the addition of saliva slightly, but not significantly, reduced the amino acid oxidation. The addition of epigallocatechin gallate (EGCG) slightly, but significantly reduced the consumption of cystine and histidine. The inhibitory effect of EGCG on the methionine consumption was more prominent, especially at higher concentrations. The Cu-induced cell death was significantly inhibited when freshly-prepared human gingival fibroblasts were incubated under hypoxic conditions. The present study demonstrates for the first time that the Cu-induced oxidation and cell death were effectively alleviated under hypoxic conditions.

Rapid Changes in Amino Acid and Polyamine Metabolism during Copper-induced Cell Death of Human Gingival Fibroblast

Hiroshi Sakagami*1, Takashi Yamazaki*2, Hiroyuki Onuki*2, Atsushi Yamazaki*3, Yasushi Hibino*3, Ken Hashimoto*1, Yumiko Kanda*4, Shiro Kunii*4, Yoshiko Yokote, Hiroshi Nakajima*3 and Jun Shimada*2 (*1 Divisions of Phamacology and *2 Oral and Maxillofacial Surgery, Department of Diagnostic and Therapeutic Sciences, *3 Division of Dental Biomaterials Science, Department of Restorative and Biomaterials Sciences, and *4 Labolatory of Electron Microscopy, Meikai University School of Dentistry, Sakado, Saitama 350-0283)
In vivo, **21**, 835-840 (2007)

There are very few studies on the interaction between dental alloys and oral tissues.

The effect of direct contact with copper (Cu) on the cellular function of human gingival fibroblast (HGF) derived from the periodontal tissues was investigated. When HGF cells were inoculated onto a Cu plate, the viability of HGF cells immediately declined. This was accompanied by vacuolization and chromatin condensation near the nuclear membrane. The intracellular concentration of spermidine and spermine declined, whereas that of putrescine slightly increased. Amino acid analysis of the medium revealed that glutamine was consumed at the greatest rate, amounting to more than half of the total amino acid consumption. Contact with the Cu plate resulted in the complete elimination of glutamine utilization and a simultaneous increase in the production of most amino acids, possibly due to enhanced proteolysis. This was accompanied by a time-dependent increase in the consumption of cystine, possibly due to oxidative reactions, and the enhanced production of glycine and glutamic acid. These data suggest that the contact with the Cu plate induced non-apoptopic cell death in HGF cells, which was tightly coupled with a rapid dysfunction of amino acid and polyamine metabolism.

Disruption of Amino Acid Metabolism in Human Myelogenous Leukemic Cell Lines Destined to Die after Contract with Metal Plates

Hiroyuki Onuki[*1], Hiroshi Sakagami[*2], Takashi Yamazaki[*1], Atsushi Yamazaki[*3], Yasushi Hibino[*3], Yoshiko Yokote, Hiroshi Nakajima[*3] and Jun Shimada[*1] (*1 Division of Oral and Maxillofacial Surgery and *2 Pharmacology, Department of Diagnostic and Therapeutic Sciences, *3 Division of Dental Biomaterials Science, Department of Restorative and Biomaterials Sciences, Meikai University of Dentistry, Sakado, Saitama 350-0283)
In vivo, **21**, 841-846 (2007)

Changes in amino acid metabolism during cell death of human myelogenous leukemic cell lines (HL-1, ML-1, KG-1) induced by contact with gold (Au), silver (Ag) or palladium (Pd) were investigated. All three leukemic cell lines consumed glutamine and serine at the highest rate (amounting to 50%-58% and 12%-16% of the total amino acid consumption, respectively). HL-60 cell growth was slightly stimulated by contact with any metal plate. Contact with Ag or Pd, but not Au plates occasionally induced cytotoxicity against ML-1 and KG-1 cells. In such cases, glutamine consumption was inhibited by 88%-90% and consumption of other amino acids completely ceased. This was accompanied by the enhanced production of arginine, glycine and glutamic acid. These data suggest the tight association of the disruption of amino acid metabolism with the cell death induced in human myelogenous leukemic cell lines by contact with metal plates.

Biological Impact of Contact with Metals on Cells

Takashi Yamazaki[*1], Atsushi Yamazaki[*2], Yasushi Hibino[*2] Shahead Ali Chowdhury[*3], Yoshiko Yokote, Yumiko Kanada[*4], Shiro Kunii[*4], Hiroshi Sakagami[*5], Hiroshi Nakajima[*2] and Jun Shimada[*1] (*1 Division of Oral Maxillofacial Surgery and *5 Division of Pharma-

cology, Department of Diagnostic and Therapeutic Sciences, *2 Division of Dental Biomaterials Sciences, Department of Restorative and Biomaterials Sciences, *3 Meikai Pharmaco-Medical Laboratory (MPL) and *4 Laboratory of Electron Microscopy, Meikai University School of Dentistry, Sakado, Saitama 350-0283)
In vivo, **20**, 605-612 (2006)

In order to investigate the *in vivo* effect of metals used in dentistry. We investigated the effect of direct contact with metal plates ($20\times20\times0.5$ mm^3) made of gold (Au), silver (Ag), copper (Cu) or palladium (Pd) on human promyelocytic leukemic HL-60 cells grown in RPMI 1640 medium supplemented with 10% fetal bovine serum. When 0.5 mL of cell suspension was applied to the metal plates, cells were precipitated on the surface of the metal plate within 10 min. Contact with Cu induced a rapid decline of cell viability, the smear pattern of DNA fragmentation, and only minor activation of caspase-3. These effects were accompanied by a progressive decrease in the extracellular concentration of methionine, cysteine and histidine, with a corresponding increase in the concentration of methionine sulfoxide. Electron microscopy showed that contact with Cu induced vacuolization and cytoplasmic damage, prior to nuclear damage, without affecting the cell surface microvilli or mitochondrial integrity. Contact with the other metals did not induce such changes during the 3 h incubation, nor was any hormetic response (beneficial action at lower concentration) observed in the cells with any metals. Addition of *N*-acetyl-L-cysteine (4-5 mM) almost completely abrogated the Cu-induced cytotoxicity, whereas sodium ascorbate (0.1-0.5 mM) and catalase (6,000[1]-30,000 units/mL) were in effective. Numerous serum proteins were adsorbed to the Ag plate, while bovine serum albumin was the major protein adsorbed to other metal plates. The present study suggests that direct contact with Cu induced non-apoptotic cell death by an oxidation-involved mechanism. The present model system may be applicable to the study of the interaction between cells and dental restorative materials.

Sequence analyses of the acid phosphatase gene (*Acph-1*) from *D. virilis* and a comparison with the *Acph-2*. Gene expression may be regulated by repeated sequences

Hiroko T. Kitagawa
Drosophila Information Service, **89**, 39-41 (2006)

The four allelic forms of ACPH specified by *Acph* locus have been found in the Japanese population of *D. virilis*. *Acph-2* comprises more than 98% of the genes in the population. Three allozyme proteins (ACPH-1, -2, and -4) out of the four allelic forms show activity differences in terms of the intensities of the electrophoretic bands; ACPH-2 has higher activity than ACPH-1 and lower than ACPH-4. Here I report the DNA sequences of the low-activity variant (*Acph-1*) gene and a comparison with the *Acph-2* gene. The organization and the length in the exon and intron of the *Acph-1* were the same as those of the *Acph-2*. When the sequences of the *Acph-1* were compared with those of the *Acph-2*,

four nucleotide changes in the coding region were found at the exon 4. This replacement does not seem to be the main cause for low activity of the ACPH-1, for it does not occur in the catalytic residues and also in the glycosylation sites. The non-coding sequences in the *Acph-1* differed from those of the *Acph-2* by 7 single-base changes and other one change involving more nucleotides. In the 3' region, gacg and gaca repeated sequences were present at the 449 bp downstream of the second poly A signal. Whereas 13 repetitions of the gacg motif were identified in this region of the *Acph-2* gene. These facts suggest that the activity difference between the ACPH-1 and the ACPH-2 is not due to the structural differences of the enzyme proteins, but rather to the transcriptional activity difference of these alleles.

Synthesis, Structures, and Properties of Nickel(Ⅱ) Mixed-Ligand Complexes Containing Various β-Diketonates and a Phosphorus Donor Bidentate Ligand

Machiko Arakawa*1, Hiroshi Miyamae, and Yutaka Fukuda*1 (*1 Department of Chemistry, Faculty of Science, Ochanomizu University)
Bull. Chem. Soc. Jpn., **80**(5), 963-965 (2007)

New mixed ligand nickel(Ⅱ) complexes containing β-diketonates and 1,2-bis-(diphenylphosphino)ethane, [Ni(dike)(dppe)]X (X = BF_4, ClO_4, and NO_3) were synthesized and characterized. Since the ligand field strength of the phosphorous donor is very strong, the complexes [Ni(dike)(dppe)]X studied in this work are as stable as the square planar both in solid and in solutions.

高次元アルゴリズム（HA: Hamiltonian Algorithm）を用いた Enkephalin の立体構造の分子動力学的研究 ── HA に現れる mixing 係数の効果 ──

土屋恭平，寺前裕之，渡邊寿雄*1，石元孝佳*1，長嶋雲兵*1（*1 産業技術総合研究所計算科学研究部門）
J. Comput. Chem. Jpn., **6**, 275-282 (2007)

In order to execute molecular dynamics (MD) simulation for the holding process and native structure of proteins efficiently, Hamiltonian algorithm (HA) was equipped to an MD program: PEACH. The Difference between the conventional method and HA is evaluated using Leu-Enkephalin and Met-Enkephalin. HA was efficient for sampling a wide area of geometrical space because many low energy conformations were observed along trajectories of HA.

生体分子の分子動力学シミュレーションにおける効率的な時間刻みの範囲 ── グリシン，アラニン，バリン，ロイシン，イソロイシン 3 量体 ──

佐藤　麗，寺前裕之，石元孝佳*1，長嶋雲兵*1（*1 産業技術総合研究所計算科学研究部門）
J. Comput. Chem. Jpn., **6**, 295–300 (2007)

In order to perform an efficient MD simulation for the biosystem, the energy error was investigated changing Δt from 0.02 fs to 3.0 fs for 5 kinds of the amino acid trimers using the Verlet method for integration. Average error is increased proportionally as the square of Δt in this case from 0.5 fs to 1.5 fs, the average error and its standard deviation were almost the same in this case whereas the errors rapidly increased in the range from 0.02 fs to 0.5 fs. No strong difference was observed between 5 amino acid trimers cases, but error accumulated as molecular size increased.

Relationship between Electronic Structure and Cytotoxic Activity of Azulenequinones and Trihaloacetylazulenes

Teruo Kurihara, Rie Satou, Takashi Miyagawa, Hidetsugu Wakabayashi, Noboru Motohashi*1 and Hiroshi Sakagami*2 (*1 Meiji Pharmaceutical University, Kiyose, Tokyo, *2 Meikai University School of Dentistry, Saitama, Japan)
In vivo, **21**, 715–720 (2007)

The relationship between the structure and cytotoxic activity of azulenequinones and trihaloacetylazulenes was investigated based on the theoretical calculations. Four different dipole moments (μ_G, μ_{ESP-G}, μ_W, and μ_{ESP-W}) and heats of formation (ΔH_f) of the azulenequinones [**1–27**] and trihaloacetylazulenes using [**28a, b–40a, b**] were separately calculated in gas-phase and aqueous-solution using the COSMO/PM3 method. The cytotoxic activity of azulenequinones was well correlated to $\Delta\Delta H_f$, HOMO energy and μ_{ESP-W}. The cytotoxic activity of trihaloacetylazulenes was correlated to $\Delta\Delta H_f$, LUMO energy and μ_{ESP-W}. QSAR may be applicable to predict the cytotoxicity of azulenequinones and trihaloacetylazulenes.

Tumor-specificity and Type of Cell Death Induced by Trihaloacetylazulenes in Human Tumor Cell Lines

Takashi Sekine, Juri Takahashi, Masayuki Nishishiro, Atsuhiro Arai, Hidetsugu Wakabayashi, Teruo Kurihara, Masaki Kobayashi*1, Ken Hashimoto*1, Hirotaka Kikuchi*1, Tadashi Katayama*1, Yumiko Kanda*1, Shiro Kunii*1, Noboru Motohashi*2, and Hiroshi Sakagami*1 (*1 Meiji Pharmaceutical University, *2 Department of Endodontics, Meikai University School of Dentistry)
Anticancer Res., **27**, 133–144 (2007)

We investigated twenty trihaloacetylazulene derivatives with either one atom of fluorine, chlorine, bromine or iodine for their tumor-specific cytotoxicity and apoptosis-inducing activity against three human normal cells and four human tumor cell lines (squamous cell carcinoma HSC-2, HSC-3, HSC-4, promyelocytic leukemia HL-60). There was no apparent difference in the cytotoxic activity between 2-methoxyazulenes and 2-ethoxyazulenes. Trichloroacetylazulenes generally showed higher cytotoxicity and tumor-specificity (expressed as TS value) as compared with corresponding trifluoroacetylazulenes. Substitution of chloride, bromide or iodine at the C-3 position further enhanced their cytotoxicity activity against four tumor cell lines especially HL-60 cells. Among twenty trihaloacetylazulene derivatives, two compounds 1-trichloroacetyl-3-bromo-2-methoxyazulene (**1**) and 1-trichloroacetyl-3-chloro-2-ethoxyazulene (**2**) showed the highest tumor specificity (TS = > 3.5 and > 2.5, respectively). Compounds **1** and **2** induced apoptotic cell death characterized by caspase-3, -8 and -9 activation and internucleosomal DNA fragmentation in HL-60 cells. On the other hand, compounds **1** and **2** induced autophagic cell death characterized by lower activation of caspases, lack of DNA fragmentation, vacuolization and autophagosome formation detected by acridine orange and LC3-GFP fluorescence, without the decline of the intracellular concentration of three major polyamines in HSC-4 cells. The cytotoxic activity of **2**, but not **1**, was slightly reduced by 3-methyladenine, an inhibitor of autophagy. These results suggest the diversity of type of cell death induced in human tumor cell lines by trihaloacetylazulene derivatives.

Factors that Affect the Type of Cell Death Induced by Chemicals

Hiroshi Sakagami[*1], Masami Kawase[*2], Hidetsugu Wakabayashi and Teruo Kurihara (*1 Department of Endodontics, Meikai University School of Dentistry, *2 Japan Faculty of Pharmaceutical Sciences, Matsuyama University)
Autophagy, **3**, 493-495 (2007)

Surveying about 1000 compounds, we found that several low molecular weight α,β-unsaturated ketones induced non-apoptotic cell death characterized by formation of autophagosome, occasionally accompanied by mitochondrial shrinkage. The cytotoxic activity of these compounds was signaificantly reduced by the addition of *N*-acetyl-L-cysteine, suggesting their interaction with SH group of intracellular targeted molecules. This suggests that the nature of chemical structure as well as the type of target cells is another factor that determines the type of cell death induced by chemicals.

The Oxydation of Bezo[*b*]thiophene Derivatives with DDQ — Preparation of π-Extended Hemithioindigoid Compounds

Hiroyuki Endo, Kinji Nagahama, Hidetsugu Wakabayashi, Makoto Kanazumi, Tatsuhisa Kato and Keiji Kobayashi
Heterocycles, **71**, 2389-2395 (2007)

Hemithioingigoid compounds, e.g. 2-fluorenylidenebenzo[*b*]thiophene-3(2H)-ones, were synthesized in good yields by the oxidation of benzo[*b*]thiophene derivatives such as 9-(2-benzo[*b*]thienyl)fluorene with DDQ in the presence of acid and under atmospheric oxygen. On the other hand, the similar reaction under nitrogen resulted in oxidative dimerization. The dimeric product was revealed by the ESR spectra to be equilibrated with radical species due to the homolytic bond dissociation.

Dynamic Equilibrium between Dissociation and Regeneration of the C-C Bond in Trispiro-Conjoined Cyclopropane Compound

Saiko Kiyohara, Koji Ishizuka, Hidetsugu Wakabayashi, Hiroshi Miyamae, Makoto Kanazumi, Tatsuhisa Kato, and Keiji Kobayashi
Tetrahedron Letters, **48**, 6877-6880 (2007)

The oxidation of 2,2-di(3,5-di-*t*-butyl-4-hydroxyphenyl)indan-1,3-dione by potassium hexacyanoferrate afforded a trispiro-conjoined cyclopropane compound. Its structure was determined by X-ray crystal analysis to indicate unequivocally involvement of a cyclopropane ring. On the other hand, in solution, the cyclopropane ring was found to exist in dynamic equilibrium with biradical species by the dissociation of the C-C bond as probed by the ^{13}C- and ^{1}H-NMR spectra as well as the ESR spectrum. When heated up to 180℃, the solid sample changed from pale yellow to orange and on cooling to room temperature reverted to pale yellow. This solid-state thermochromic behavior was interpreted by means of a remarkably elongated C-C bond of the cyclopropane ring which would easily undergo homolytic cleavage.

2. Books, Reviews and Other Printings

MATHEMATICS

不確実性理論の基礎

岩村覚三
Baoding Liu, Foundation of Uncertainty Theory, 2005, Uncertainty Theory Laboratory, Dept. of Mathematical Sciences, Tsinghua University, Beijing, China（English）, World Academic Press UK（2007, 翻訳代表）

CHEMISTRY

計算化学汎用プログラム（第 1 回）分子設計統合ソフト HyperChem

寺前裕之
PETROTECH., **30**, 346–350（2007）

Maple を用いた量子化学入門教材の作成

栗原照夫，上村拓矢
城西情報科学研究，**17**(1), 19–37（2007）

BIOLOGY

ヒトの身長・体重における親子相関
小須田和彦
城西大学研究年報（自然科学編），**30**, 1–13（2007）

PHYSICAL EDUCATION

バレーボール国際試合における医事活動について

田中喜久美[*1]，川之上　豊[*2]，明石正和（*1 甲府看護専門学校，*2 大妻女子大学）
城西大学研究年報（自然科学編），**30**, 65–74（2007）

短期滞在型インターバル高所トレーニングの実践研究

山口敏夫[*1]，石井隆士[*2]，鈴木尚人，若山章信[*1]（*1 東京女子体育大学，*2 日本体育大学）
トレーニング科学，**14**(4)，369-376（2007）

3. Oral Presentations

MATHEMATICS

Factorization of Elements in Classical Groups into a Product of Involutions

H. Ishibashi
Fourth International Conference of Applied Mathematics and Computing, Plovdiv Technical University, プロブディブ, ブルガリア, 2007 年 8 月 12 日–18 日

From finitely independent fuzzy sets to possibility based linear programming problem

影山正幸*, 岩村覚三（* 千葉大学大学院自然科学研究科）
日本 OR 学会「不確実環境下での柔構造最適化モデリング」研究部会, 2007 年 5 月 26 日（土), 千葉大学理学系総合研究棟

A search of the shortest path considering about effects of angles

Makoto Horiike* and Kazuko Iwamura（* Faculty of Economics, Teikyo University）
Proceedings of the Sixth International Conference on Information and Management Sciences, Lhasa, China, July 1–6, 2007, pp. 451–454

From Finitely Many Independent Fuzzy Numbers to Possibility-based Fuzzy Linear Programming Problems

Masami Kurano[*1], Masayuki Kageyama[*2], Masami Yasuda[*2] and Kazuko Iwamura（*1 Graduate School of Education, Chiba University, *2 Graduate School of Science and Technology, Chiba University）
Proceedings of the Sixth International Conference on Information and Management Sciences, Lhasa, China, July 1–6, 2007, pp. 607–611

国際会議報告「6th Int. Conf. on Inf. Man. Sci.」（Chibet）に参加して

岩村覚三
日本 OR 学会「不確実環境下での柔構造最適化モデリング」研究部会, 2007 年 7 月 28 日（土), 千葉大学理学系総合研究棟

CHEMISTRY

Isolation and Characterization of the β–esterase (est-B) gene in *Drosophila virilis*

北川浩子
第 30 回分子生物学会，第 80 回日本生化学会合同年会（横浜），2007 年 12 月，講演要旨集，p. 579

Vibrational-Rotational Spectrum of GaF and the Analysis with a Non-Born-Oppenheimer Effective Hamiltonian

Hiromichi Uehara and Koui Horiai
6th International Conference on Tunable Diode Laser Spectroscopy (Reims) July 9–13, 2007 Abstracts of Papers p. 140

二原子分子スペクトル fit の解析アプローチにおける高次項への拡張

上原博通，野口剛範，堀合公威
日本化学会第 87 春季年会（吹田），2007 年 9 月，3PC–017

GaF 倍音の赤外ダイオードレーザー分光

堀合公威，野口剛範，上原博通
第 1 回分子科学討論会（仙台），2007 年 9 月，1P111

SiO スペクトルの Non-Born-Oppenheimer 解析

廣瀬　隆，堀合公威，上原博通
第 1 回分子科学討論会（仙台），2007 年 9 月，4P110

Kr_2–CO_2, Xe_2–CO_2 三量体の赤外吸収スペクトル

山口慎也，紺野東一，尾崎　裕
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