

Dynamic Vapochromic Behaviors of Organic Crystals Based on the Open-Close Motions of S-Shaped Donor-Acceptor Folding Units

Takahashi, E.; Takaya, H.; Naota, T.
(Graduate School of Engineering Science)

Chemistry - A European Journal, 16,
4793-4802 (2010)

▲From *Chemistry-A European Journal*, 16, Naota, T. et al., Dynamic Vapochromic Behaviors of Organic Crystals Based on the Open-Close Motions of S-Shaped Donor-Acceptor Folding Units, 4793-4802, 2010. Copyright Wiley-VCH Verlag GmbH & Co. KGaA. Reproduced with permission.



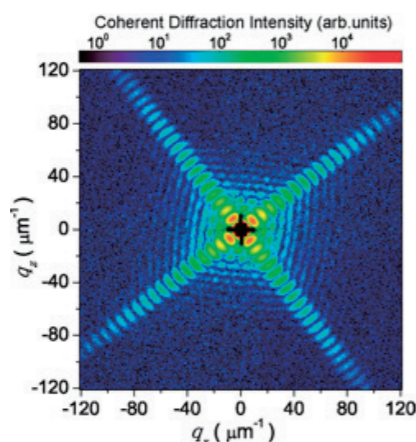
The first vapochromic organic crystals are described with respect to color change, adsorption/desorption properties, crystal structures, and color change mechanism. Non-solvatochromic, NDI derivatives bearing pyrrole imine (PI) tethers have been used as a motif for the crystal packing template. This crystal showed high adsorption ability and vapor-dependent color

changes upon exposure to a variety of organic vapors. Molecular structures indicated that (1) crystal unit had an S-shaped folded conformation by D-A interactions between NDI and PI units; (2) inclusion of the guest vapor into the S-shaped template decreased the intramolecular PI-NDI interactions, accompanied by increasing intermolecular NDI-NDI and PI-PI interactions.

High-resolution Diffraction Microscopy Using the Plane-wave Field of a Nearly Diffraction Limited Focused X-ray Beam

Takahashi, Y.; Nishino, Y.; Tsutsumi, R.; Kubo, H.; Furukawa, H.; Mimura, H.; Matsuyama, S.; Zettsu, N.; Matsubara, E.; Ishikawa, T.; Yamauchi, K.
(Graduate School of Engineering)

Physical Review B, 80, 054103 (2009)



X-ray microscopy has contributed greatly to our knowledge of the structure and function not only in physics but also various other fields and is an indispensable tool in recent nanoscience and nanotechnology. We proposed a method for dramatically improving the spatial resolution of X-ray microscopy and demonstrated at a synchrotron experiment in SPring-8. High-density coherent X-ray beam was produced by X-ray focusing mirrors which were accurately fabricated by elastic emission machining technique. A high contrast diffraction pattern of a silver nanocube was observed. An image of the nanocube was successfully reconstructed by an iterative phasing method and its half-period resolution was 3.0 nm.

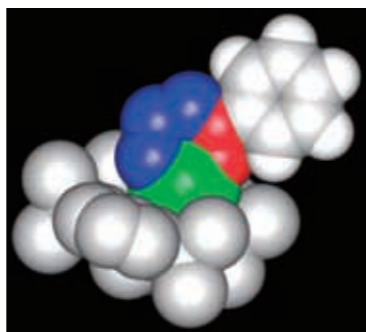
Synthesis and Reactivity of Six-Membered Oxa-Nickelacycles: A Ring-Opening Reaction of Cyclopropyl Ketones

Tamaki, T.; Nagata, M.; Ohashi, M.; Ogoshi, S.
(Graduate School of Engineering)

Chemistry A European Journal, 15,
10083-10091 (2009)

Transition metal-catalyzed cycloaddition reaction is one of the most powerful methods of the synthesis of cyclic compounds. We examined nickel-catalyzed [3+2] cycloaddition reaction of cyclopropyl ketones. In this reaction, six-membered oxa-nickelacycles were proposed as a key reaction intermediate. Cyclopropyl phenyl ketone reacted with Ni(cod)₂ and IPr to give the corresponding six-membered oxa-nickelacycle. The molecular structure was determined by X-ray crystallographic analysis and it shows a monomeric nickelenolate structure. The coordination geometry of the nickel(II) center (formally 14-electron) is

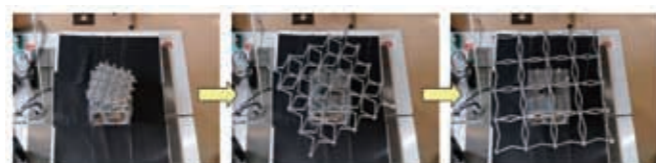
regarded as 'an unusual T-shaped planar.' This complex reacted with enones to afford η³-oxa-allylnickel complexes.



In-plane Mechanical Behaviors of 2D Repetitive Frameworks with Four-coordinate Flexible Joints and Elbowed Beam Members

Tanaka, H.; Shibutani, Y.
(Graduate School of Engineering)

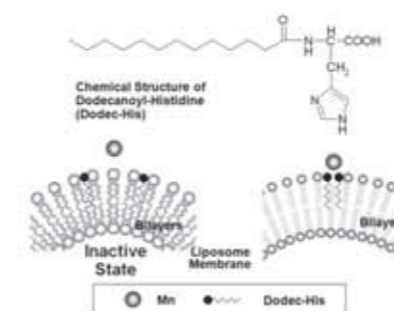
Journal of the Mechanics and Physics of Solids, 57, 1485-1499 (2009)



Mechanical properties of an open-framework structure constructed by joints and beam members are strongly influenced by the geometrical configuration and joint flexibility. This paper highlights the effect of joint flexibility to the structure deformability, and originally proposes two types of in-plane anisotropic structures made up of four-coordinate flexible joints and elbowed beam members. Analyses under uniaxial tension reveal the novel linear and nonlinear

elastic responses by applying straightforward joint modeling with multi-rotational degrees of freedom. These results suggest that the curious deformations manners, such as auxetic deformation with a negative Poisson's ratio or the telescopic motion under kinematic indeterminacy, are potentially realized. The latter motion has already worked out as the patent-protected technology, as shown in the attached figures.

An antioxidative liposome catalyst, LIPOzyme, that mimics both superoxide dismutase (SOD) and peroxidase (POD)-like activities has

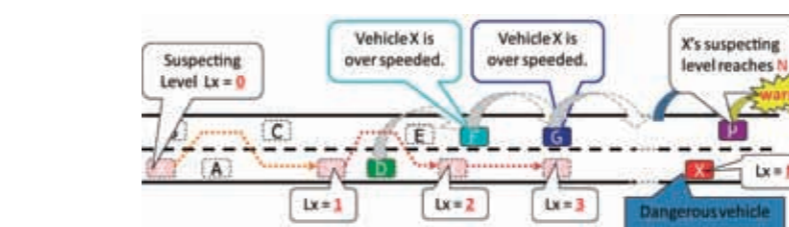


been developed by using liposomes modified with simple ligands (dodecanoyl-histidine, Dodec-His) and metal ions (Mn). The SOD-like activity is dependent on the stability of the ligand-metal complex on the liposome membrane with the value being higher. The POD-like activity was found to be maximal in the case of the specific liposome, in which the ligand-metal complex is inserted more deeply into the membrane. It was thus shown that liposome modified with simple ligands can exhibit different enzyme-like activities depending on the characteristics of the liposome membrane.

Development of Liposome-based Mimics of Superoxide Dismutase and Peroxidase Based on "LIPOzyme" Concept

Umakoshi, H.; Morimoto, K.; Yasuda, N.; Shimanouchi, T.; Kuboi, R.
(Graduate School of Engineering Science)

Journal of Biotechnology, 147, 59-63
(2010)



We propose the dangerous vehicle-detection protocol (DVDP) to detect drivers who violate the permitted speed limit. In DVDP, each vehicle collects surrounding vehicles' identifications and propagates it as warning information hop-by-hop using ad hoc communications. Preceding vehicles estimate their surrounding vehicles' speed based

on the received information to find "dangerous vehicles" and warn about them. We have evaluated the performance of DVDP using a simulator that performs both macroscopic and microscopic traffic simulation. Simulation results have revealed that DVDP's detection probability is greater than 80% when vehicle density is above 40 vehicles/min.

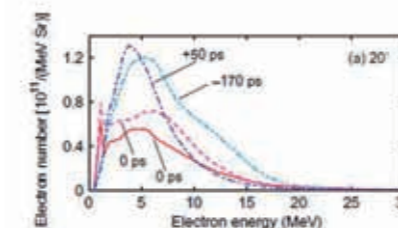
An Intervehicular-Communication Protocol for Distributed Detection of Dangerous Vehicles

Umedu, T.; Isu, K.; Higashino, T.; Toh, C. K.
(Graduate School of Information Science and Technology)

IEEE Transactions on Vehicular Technology, 59 (2), 627-637 (2010)

Anomalous resistivity for MeV electrons passing through a model core plasma is studied for fast ignition laser fusion. The electrons generated by an ultra-intense laser are measured after they pass through a highly dense plasma with a density of 50 g cm⁻³ in a radius of 25 μm. When significant fusion process enhancements are achieved by the ultra-intense laser pulse injection, the energy reduction of fast electrons observed should be used to heat the core. We propose a new physical mechanism for the heating. The energy dissipation in the shock region can

explain observed electron stopping up to 15 MeV.

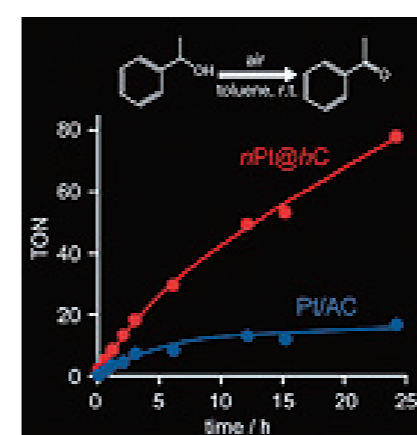


▲Reprinted from *New Journal of Physics*, 11, 2009, 093031, Evidence of anomalous resistivity for hot electron on propagation through a dense fusion core in fast ignition experiments, Tanaka, K.A. et al., with permission from IOP Publishing Ltd and Deutsche Physikalische Gesellschaft.

Evidence of anomalous resistivity for hot electron on propagation through a dense fusion core in fast ignition experiments

Yabuuchi, T.¹; Das, A.; Kumar, G.R.; Habara, H.^{1,2}; Kaw, P.K.; Kodama, R.^{1,2}; Mima, K.²; Norreys, P.K.; Segupta, S.; Tanaka, K.A.^{1,2}
¹(Graduate School of Engineering)
²(Institute of Laser Engineering)

New Journal of Physics, 11, 093031 (2009)



The primary reasons for the high activity and durability of Pt nanoparticles embedded in microporous carbon (nPt@hC) for aerobic oxidation of alcohols were examined. Analyses of mechanistic aspects revealed that the high activity originates from the stabilization of a partially positive charged transition state in the rate-determining step induced by the surrounding electron-rich carbon matrix, resulting in a decrease in reaction activation energy. Moreover, detailed investigation of Pt nanoparticles in nPt@hC revealed that the deactivation of nPt@hC is effectively suppressed by the suppression of aggregation of Pt nanoparticles and chemical poisoning of their surfaces.

Origin of the High Activity of Porous Carbon-Coated Platinum Nanoparticles for Aerobic Oxidation of Alcohols

Ng, Y. H.; Ikeda, S.; Morita, Y.; Harada, T.; Ikeue, K.; Matsumura, M.
(Research Center for Solar Energy Chemistry)

The Journal of Physical Chemistry C, 113,
12799-12805 (2009)