



Bulletin of the
Chemical
Society of
Japan

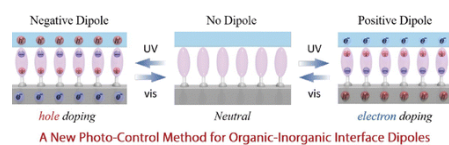
Account/Review Collection
2018

A New Photo-Control Method for Organic–Inorganic Interface Dipoles and Its Application to Photo-Controllable Molecular Devices

Masayuki Suda

Bull. Chem. Soc. Jpn **2018**, *91*, 19–28.

<https://www.journal.csj.jp/doi/abs/10.1246/bcsj.20170283>



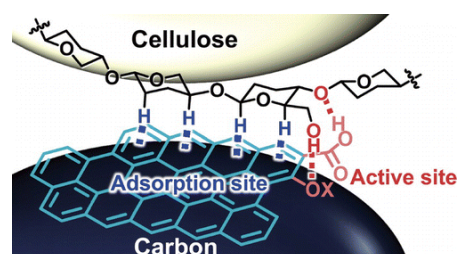
A novel strategy to photo-control molecular dipoles through the use of photochromic SAMs is proposed. This account provides a review of the basic concept of the photo-control of interface dipoles and the recent advances in the development of photo-controllable molecular devices which have been developed based on this strategy.

Development of Solid Catalyst–Solid Substrate Reactions for Efficient Utilization of Biomass

Hirokazu Kobayashi* and Atsushi Fukuoka

Bull. Chem. Soc. Jpn **2018**, *91*, 29–43.

<https://www.journal.csj.jp/doi/abs/10.1246/bcsj.20170263>



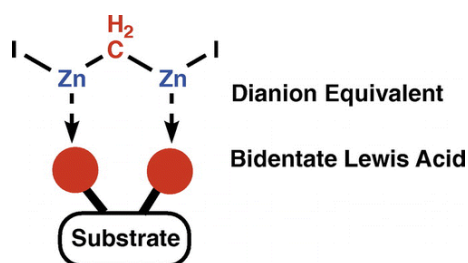
We describe our approach to convert lignocellulosic biomass by solid catalysts. Carbons bearing weak acid sites are active for the hydrolysis of cellulose. The formation of both good physical and chemical contacts between solid catalyst–solid cellulose leads to high yield of glucose. Cellulose has interactions derived from polar and non-polar groups, and carbons utilize both interactions to achieve efficient hydrolysis.

Molecular Transformations Using Bis(iodozincio)methane—The Role of Chelation in Main Group Organometallic Chemistry

Sejiro Matsubara

Bull. Chem. Soc. Jpn **2018**, *91*, 82-86.

<https://www.journal.csj.jp/doi/abs/10.1246/bcsj.20170281>



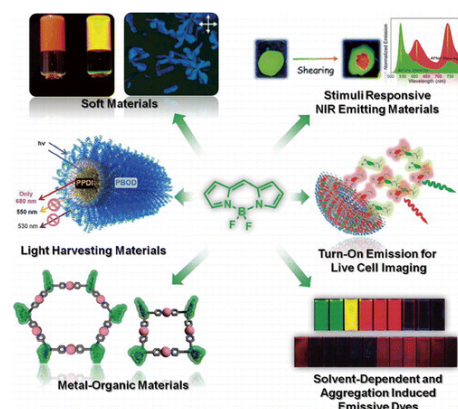
The stereoselectivity for the addition of an organometallic reagent to an aldehyde or ketone possessing a Lewis basic atom at the α -position can be predicted according to the well-known Chelation Model. Herein we discuss stereoselective reactions of bis(iodozincio)methane, which can coordinate to a heteroatom containing substrate with two zinc atoms in the reagent. Zinc atom coordination in a face-to-face manner to substrates containing two heteroatoms enables specific molecular recognition, realizing novel molecular transformations.

Self-Assembly of Bodipy-Derived Extended π -Systems

Sandeep Cherumukkil, Balaraman Vedhanarayanan, Gourab Das, Vakayil K. Praveen, and Ayyappanpillai Ajayaghosh*

Bull. Chem. Soc. Jpn **2018**, *91*, 100-120.

<https://www.journal.csj.jp/doi/abs/10.1246/bcsj.20170334>



Bodipy dyes have been used for the development of organogels, liquid crystals, NIR emitting materials, organic nanoparticles, metal-organic materials etc. These materials derived from self-assembled Bodipy dyes are useful for various applications such as sensing, bio-imaging, targeted drug delivery, photodynamic and photothermal therapy, etc. This review showcases recent developments in this exciting area of research.

Thiophene-Fused Naphthalene Diimides: New Building Blocks for Electron Deficient π -Functional Materials

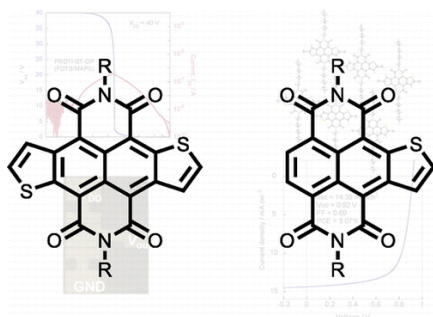
Kazuo Takimiya* and Masahiro Nakano

Bull. Chem. Soc. Jpn **2018**, *91*, 121-140.

<https://www.journal.csj.jp/doi/abs/10.1246/bcsj.20170298>



A brief overview of thiophene-fused naphthalene diimide, namely naphtho[2,3-*b*:6,7-*b'*]dithiophene diimide (NDTI) and naphtho[2,3-*b*]thiophene diimide (NTI), recently developed as novel electron deficient building blocks is provided. These emerging building blocks are promising as the key structures for n-type and ambipolar semiconductors in organic field-effect transistors, electron acceptors in organic photovoltaics, and n-type thermoelectric materials.



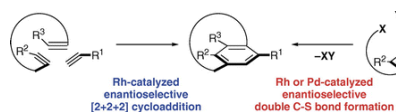
Vol. 91, No.2

Catalytic Enantioselective Synthesis of Planar Chiral Cyclophanes

Ken Tanaka

Bull. Chem. Soc. Jpn **2018**, *91*, 187-194.

<https://www.journal.csj.jp/doi/abs/10.1246/bcsj.20170346>



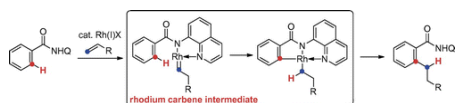
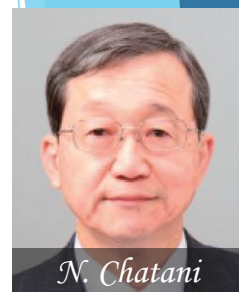
The catalytic enantioselective synthesis of planar chiral cyclophanes has been achieved by two types of transition-metal catalysis: (1) enantioselective construction of aromatic rings by cationic rhodium(I)/chiral bisphosphine complex-catalyzed [2+2+2] cycloaddition reactions; (2) enantioselective construction of ansa chains the cationic rhodium(I) or palladium(II)/chiral bisphosphine complex-catalyzed double C-S bond forming reactions.

The Use of a Rhodium Catalyst/8-Aminoquinoline Directing Group in the C-H Alkylation of Aromatic Amides with Alkenes: Possible Generation of a Carbene Intermediate from an Alkene

Naoto Chatani

Bull. Chem. Soc. Jpn **2018**, *91*, 211-222.

<https://www.journal.csj.jp/doi/abs/10.1246/bcsj.20170316>



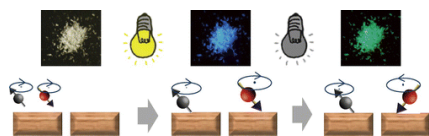
Rhodium-catalyzed alkylation reactions of C-H bonds (hydroarylation) in aromatic amides that contain an 8-aminoquinoline as a directing group with alkenes are discussed. Various alkenes, including acrylic esters, styrenes, α,β -unsaturated butyrolactones, dihydrofurans, maleimides, and norbornene derivatives are applicable to this C-H alkylation. The reaction with norbornene gives unusual endo-hydroarylation products in a high degree of selectivity. The use of a carboxylic acid as an additive dramatically increases both the reactivity and the selectivity of the reaction. The results of deuterium-labeling experiments suggest that hydrometalation or carbometalation, which are commonly accepted mechanisms for C-H alkylation reactions, are not involved. Instead, the reaction appears to proceed through a rhodium carbene intermediate generated from the alkene.

Intersystem Crossing Mechanisms in the Room Temperature Phosphorescence of Crystalline Organic Compounds

Hideya Yuasa* and Shinichi Kuno

Bull. Chem. Soc. Jpn **2018**, *91*, 223-229.

<https://www.journal.csj.jp/doi/abs/10.1246/bcsj.20170364>



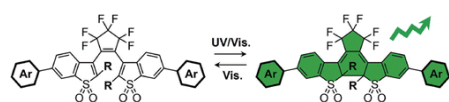
The main intersystem crossing mechanisms suggested to date of the room temperature phosphorescence of heavy-atom-free, crystalline organic compounds are described. We focus on our own findings of hyperfine-coupling-assisted intersystem crossing in radical ion pairs. The other interesting hypotheses are also introduced.

Photoswitchable Turn-on Mode Fluorescent Diarylethenes: Strategies for Controlling the Switching Response

Masahiro Irie* and Masakazu Morimoto

Bull. Chem. Soc. Jpn **2018**, *91*, 237-250.

<https://www.journal.csj.jp/doi/abs/10.1246/bcsj.20170365>



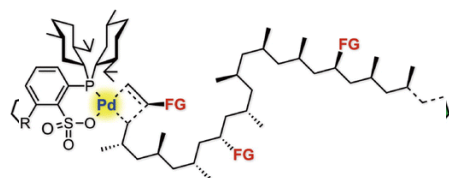
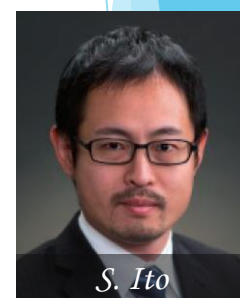
Recent development and future prospect of photochromic diarylethenes that undergo turn-on mode fluorescence switching upon photoirradiation are described. By chemical modifications of the structures their switching response was tuned to meet the requirements for super-resolution fluorescence microscopies. The water-soluble derivatives have been successfully applied to acquire super-resolution bioimages using a single-wavelength visible beam.

Palladium-Catalyzed Homo- and Copolymerization of Polar Monomers: Synthesis of Aliphatic and Aromatic Polymers

Shingo Ito

Bull. Chem. Soc. Jpn **2018**, *91*, 251-261.

<https://www.journal.csj.jp/doi/abs/10.1246/bcsj.20170347>



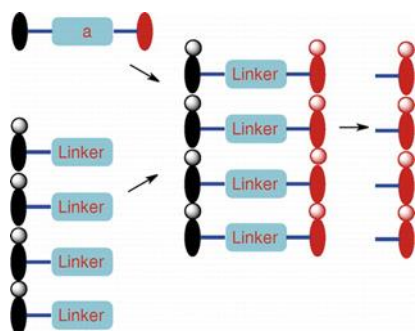
This account describes our achievements in the palladium-catalyzed coordination–insertion (co)polymerization of polar monomers for the syntheses of a variety of functional polymers, ranging from functionalized polyolefins via olefin/polar monomer copolymerization to *o*-arylene-containing polymers via formal aryne polymerization.

Polynorbornene-based Template for Polymer Synthesis

Guoqiao Lai and Tien-Yau Luh*

Bull. Chem. Soc. Jpn **2018**, *91*, 262-273.

<https://www.journal.csj.jp/doi/abs/10.1246/bcsj.20170354>



The recent advances on the use of polynorbornene or polycyclobutene as the template for the synthesis of a range of different condensation polymers with well-defined degree of polymerization and narrow polydispersity are reviewed.

Graph Theory of Ring-Current Diamagnetism

Jun-ichi Aihara

Bull. Chem. Soc. Jpn **2018**, *91*, 274-303.

<https://www.journal.csj.jp/doi/abs/10.1246/bcsj.20170318>



$$ASE \propto \sum_i^{\text{all circuits}} A_i$$

$$\chi_G \propto \sum_i^{\text{all circuits}} A_i S_i^2$$

S_i is the area enclosed by the i th circuit.

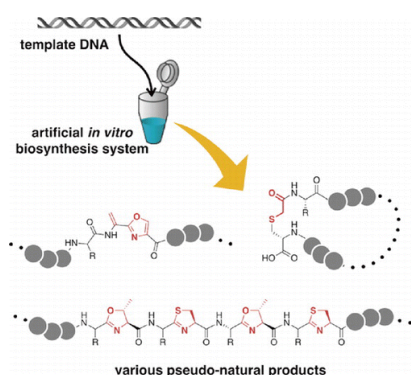
Aromatic stabilization energy (ASE) can be derived from the ring-current diamagnetic susceptibility (χ_G), which leads to the unification of energetic and magnetic criteria of aromaticity. ASE is given as a sum of the circuit contributions (A_i) to aromaticity.

Artificial *In Vitro* Biosynthesis Systems for the Development of Pseudo-Natural Products

Yuki Goto* and Hiroaki Suga*

Bull. Chem. Soc. Jpn **2018**, *91*, 410-419.

<https://www.journal.csj.jp/doi/abs/10.1246/bcsj.20170379>



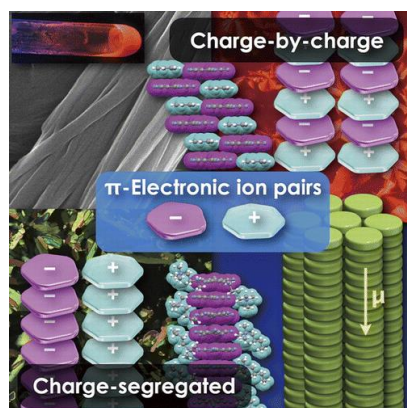
Recent advances in genome database has allowed discovery of novel classes of natural products and their biosynthetic enzymes. Given the potentials and advantages of the biosynthetic enzymes, they are applicable to not only the production of natural products but also synthesis and discovery of artificial molecules with desired functions. This account describes our recent efforts to develop artificial *in vitro* biosynthesis systems that potentially allow for the elaboration of pseudo-natural peptides with novel bioactivities.

Dimension-Controlled π -Electronic Ion-Pairing Assemblies

Yohei Haketa and Hiromitsu Maeda*

Bull. Chem. Soc. Jpn **2018**, *91*, 420-436.

<https://www.journal.csj.jp/doi/abs/10.1246/bcsj.20170434>



Ion-pairing assemblies consisting of appropriately designed π -electronic ionic species afford various solid-state and soft materials through electrostatic interaction as well as other weak noncovalent interactions. This article summarizes recent progresses in preparation methods of π -electronic ionic species and ion pairs along with the assembling structures and properties of dimension-controlled π -electronic ion-pairing assemblies.

Fluorescent Metal Nano-Clusters as Next Generation Fluorescent Probes for Cell Imaging and Drug Delivery

Kankan Bhattacharyya* and Saptarshi Mukherjee*

Bull. Chem. Soc. Jpn **2018**, *91*, 447-454.

<https://www.journal.csj.jp/doi/abs/10.1246/bcsj.20170377>



Fluorescent metal nano-clusters with size-dependent properties have emerged as the next generation fluorophores with versatile applications. In this article, we give a brief overview on three fluorescent metal nano-clusters, (gold, silver and copper). Because of their non-toxicity and solubility in water they are highly suitable for biological systems and in particular, live cell imaging. We show that they may be used for distinguishing cancer and non-cancer cells and selective killing of cancer cells. We also discuss their effect on enzyme catalysis.

Filamentous Viruses as Building Blocks for Hierarchical Self-Assembly toward Functional Soft Materials

Toshiki Sawada* and Takeshi Serizawa*

Bull. Chem. Soc. Jpn **2018**, *91*, 455-466.

<https://www.journal.csj.jp/doi/abs/10.1246/bcsj.20170428>



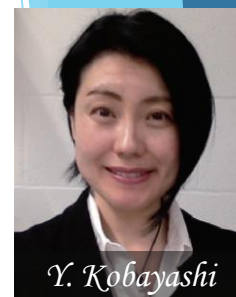
This review describes the utilization of M13 phage, one of the filamentous viruses, for the development of functional soft materials. The combination of genetic engineering-based functionalization and liquid crystal formation can be effectively used to develop structurally regular hybrid materials composed of M13 phages with other materials. M13 phages can be used for various functional soft materials as building blocks.

Pure Organic Conductors Based on Protonic-Defect Induction: From Semiconductors to Organic Metals

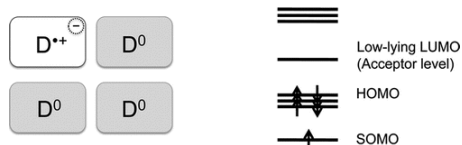
Yuka Kobayashi

Bull. Chem. Soc. Jpn **2018**, *91*, 467-485.

<https://www.journal.csj.jp/doi/abs/10.1246/bcsj.20170374>



TTF-based pure organic electroactive molecules, which have been recently developed on the basis of protonic-defect induced carrier generation, are introduced in this account. The molecular design controls their transport properties from semiconducting to metallic even with a single-component molecular structure. The principle of the design, carrier generation mechanism and electronic properties are comprehensively reviewed.

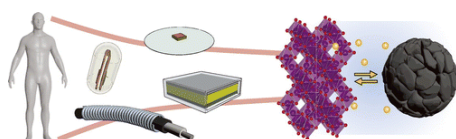


Biocompatible Batteries—Materials and Chemistry, Fabrication, Applications, and Future Prospects

Sven Stauss* and Itaru Honma*

Bull. Chem. Soc. Jpn **2018**, *91*, 492-505.

<https://www.journal.csj.jp/doi/abs/10.1246/bcsj.20170325>



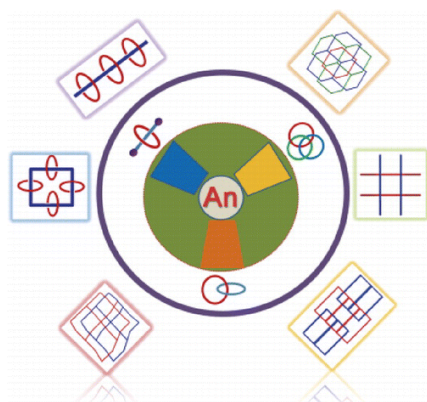
This review highlights recent advances and performances of biocompatible batteries, which are expected to play increasingly important roles in medical electronic implantable devices and point-of-care systems, but also for environmental sensing and transient electronics.

Ordered Entanglement in Actinide-Organic Coordination Polymers

Lei Mei, Wei-qun Shi,* and Zhi-fang Chai

Bull. Chem. Soc. Jpn **2018**, *91*, 554-562.

<https://www.journal.csj.jp/doi/abs/10.1246/bcsj.20170418>



For this contribution, we will summarize the classification in the reported actinide-organic entangled structures by classifying them according to the diverse catalogues of individual motifs and entangled patterns between them, among which are included all these intriguing types of entanglement in different separate sections: 1) polyrotaxanes; 2) parallel interpenetration (INT) and polycatenation (P-CAT and I-CAT); and 3) Borromean ring (BR).

Self-Assembly of Discrete Organic Nanotubes

Toshimi Shimizu

Bull. Chem. Soc. Jpn **2018**, *91*, 623-668.

<https://www.journal.csj.jp/doi/abs/10.1246/bcsj.20170424>



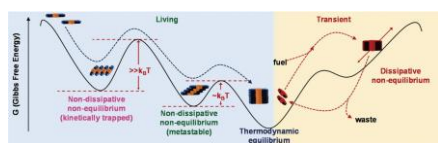
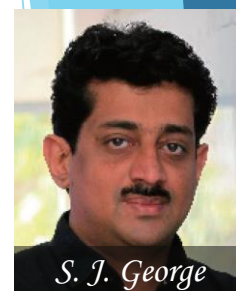
This review article covers recent advances from 2010 on, regarding the molecular self-assembly into discrete closed hollow structures (organic nanotubes) from molecular building blocks. Starting with the comparison of synthetic procedures and physical properties between the ONTs and carbon nanotubes (CNTs), the author discusses the detailed features in line with the classification for the formation mechanism of self-assembled ONTs; membrane or sheet-based, nanoring- or nanotoroid-based, stacking-based, and supramolecular stacking-based pathways.

Temporally Controlled Supramolecular Polymerization

Shikha Dhiman and Subi J. George*

Bull. Chem. Soc. Jpn **2018**, *91*, 687-699.

<https://www.journal.csj.jp/doi/abs/10.1246/bcsj.20170433>



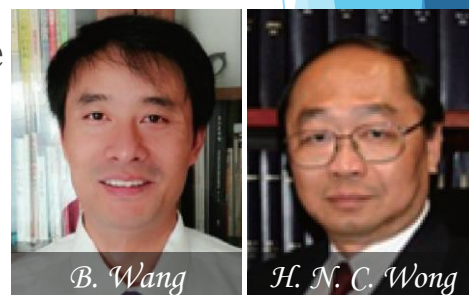
Recent interests towards living and transient supramolecular polymerization has uncovered the facet of temporal control in supramolecular polymers. To achieve temporal control, understanding of energy landscapes of supramolecular polymerization is important to build new and generalized strategies.

Bromine-Mediated Cross-Dehydrogenative Coupling (CDC) Reactions

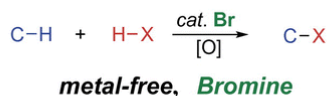
Bin Wang* and Henry N. C. Wong

Bull. Chem. Soc. Jpn **2018**, *91*, 710-719.

<https://www.journal.csj.jp/doi/abs/10.1246/bcsj.20170393>



Bromine-Mediated Cross-Dehydrogenative Coupling
BCDC reaction



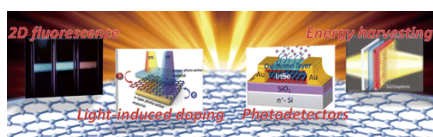
A variety of readily available, cheap and environmentally friendly bromine reagents have been used for bromination or oxidation in organic synthesis. This review is a summary of bromine-mediated Cross-Dehydrogenative Coupling (CDC) reactions, showing promising future applications in metal-free functionalization of C-H bonds.

Light and Matter Interaction in Two-Dimensional Atomically Thin Films

Rajesh Kumar Ulaganathan, Yi-Hsuan Chang, Di-Yan Wang, and Shao-Sian Li*

Bull. Chem. Soc. Jpn **2018**, *91*, 761-771.

<https://www.journal.csj.jp/doi/abs/10.1246/bcsj.20180016>



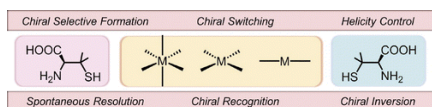
Atomically thin 2D materials have already shown great potential in electronics due to the excellent electrical properties. The outstanding performance in electronics underrated the potential of 2D materials to be influenced by light. In this review, we shed light on the interactions of 2D materials with photons, through fluorescence, light-induced photo-doping effect, and the applications utilized in optoelectronics.

Chiral Phenomena in Multinuclear and Metallosupramolecular Coordination Systems Derived from Metalloligands with Thiol-Containing Amino Acids

Nobuto Yoshinari and Takumi Konno*

Bull. Chem. Soc. Jpn **2018**, *91*, 790-812.

<https://www.journal.csj.jp/doi/abs/10.1246/bcsj.20180032>



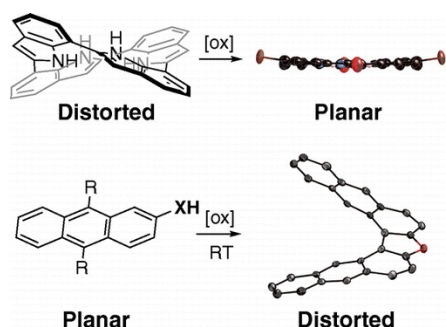
Since the establishment of coordination chemistry by A. Werner, the creation of chiral metal complexes has been one of the most important topics in the field of coordination chemistry. In this account, we focus on the stereochemical and chiral behavior of S-bridged multinuclear and metallosupramolecular compounds that are derived from metalloligands with cysteine or penicillamine.

Innovative Synthesis and Functions of Curved π -Conjugated Molecules

Satoru Hiroto

Bull. Chem. Soc. Jpn **2018**, *91*, 829-838.

<https://www.journal.csj.jp/doi/abs/10.1246/bcsj.20170435>



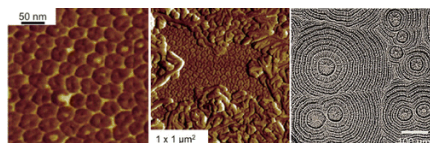
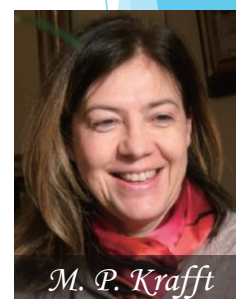
I succeeded in the synthesis of novel π -conjugated molecules based on the strategies of “distortion-to-planar” and “planar-to-distortion”. The first strategy produced a cyclic tetraindole, and 10-heterocorroles as novel porphyrinoids. The second strategy enabled construction of heteroatom-containing curved π -conjugated molecules under the laboratory conditions.

Self-Organization of Semifluorinated Alkanes and Related Compounds at Interfaces: Thin Films, Surface Domains and Two-Dimensional Spherulites

Xianhe Liu, Jean G. Riess, and Marie Pierre Krafft*

Bull. Chem. Soc. Jpn **2018**, *91*, 846-857.

<https://www.journal.csj.jp/doi/abs/10.1246/bcsj.20170431>



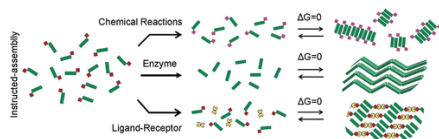
Numerous studies involving various semifluorinated alkanes, spreading techniques and experimental conditions have determined that formation and ordering of molecular surface nanodomains on water and solid supports (including liquid crystals) are intrinsic properties of fluorocarbon/hydrocarbon diblocks. These domains do not coalesce when compressed and survive beyond monolayer collapse. Formation of two-dimensional radial or ring-banded spherulites has also been observed.

Instructed-Assembly (iA): A Molecular Process for Controlling Cell Fate

Hongjian He and Bing Xu*

Bull. Chem. Soc. Jpn **2018**, *91*, 900-906.

<https://www.journal.csj.jp/doi/abs/10.1246/bcsj.20180038>



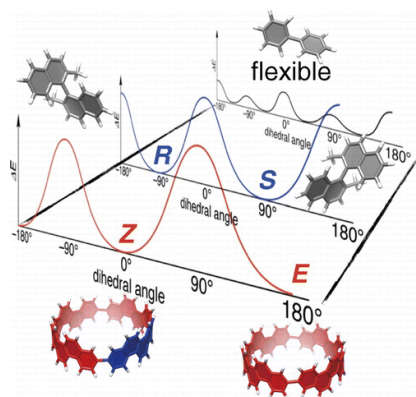
Instructed-assembly (iA) is the formation of ordered superstructures of molecules as the result of certain trigger events. This account briefly summarizes the accomplishments and progresses achieved in the development of iA, and discusses the challenges and the perspectives of the future development of iA.

Stereoisomerism and Structures of Rigid Cylindrical Cycloarylenes

Zhe Sun, Taisuke Matsuno, and Hiroyuki Isobe*

Bull. Chem. Soc. Jpn **2018**, *91*, 907-921.

<https://www.journal.csj.jp/doi/abs/10.1246/bcsj.20180051>



When arylene panels are covalently linked in a circle, there emerges a unique stereoisomerism particularly in molecules with cylindrical structures. The stereoisomerism results in coplanar, *E/Z* arrays of panels to form a rigid cylinder and gives an insight into fundamental structural chemistry of carbon nanotubes.

Physicochemical and Biological Characterisation of Azobenzene-Containing Photoswitchable Surfactants

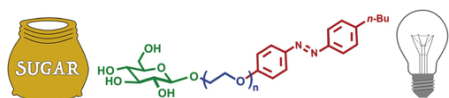
Rico F. Tabor,* Thomas M. McCoy, Yingxue Hu, and Brendan L. Wilkinson

Bull. Chem. Soc. Jpn **2018**, *91*, 932-939.

<https://www.journal.csj.jp/doi/abs/10.1246/bcsj.20180024>



This work summarises and contextualizes recent developments in the field of azobenzene-containing light-sensitive surfactants. These molecules can be addressed externally by light of specific wavelengths in a highly spatially and temporally resolved fashion, providing unique opportunities in a variety of surface and colloid chemistry fields, from capturing and dispersing valuable carbon nanomaterials to probing mechanistic aspects of bacterial growth.



Unresolved Issues that Remain in Molecular Self-Assembly

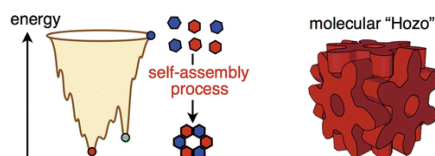
Shuichi Hiraoka

Bull. Chem. Soc. Jpn **2018**, *91*, 957-978.

<https://www.journal.csj.jp/doi/abs/10.1246/bcsj.20180008>



Two unresolved issues in molecular self-assembly are discussed. Firstly, a novel method for the investigation of self-assembly processes (QASAP) was developed and the coordination assembly processes revealed by QASAP are discussed. Secondly, a novel strategy for the construction of discrete assemblies in water (molecular Hozo) is introduced, which enabled us to develop extremely stable discrete assemblies, nanocubes, in water.

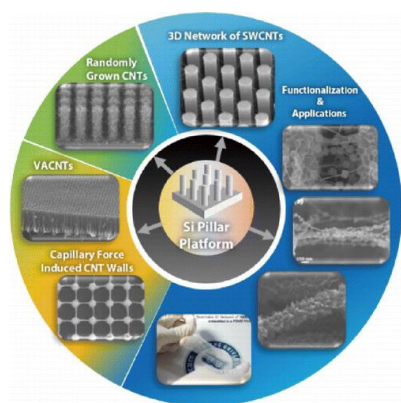


Silicon Pillar Structure Assisted Three Dimensional Carbon Nanotube Assembly: Fabrications and Rational Surface Modifications

Rui Chen, Jihoon Kang, Minsung Kang, Haedong Lee, and Haiwon Lee*

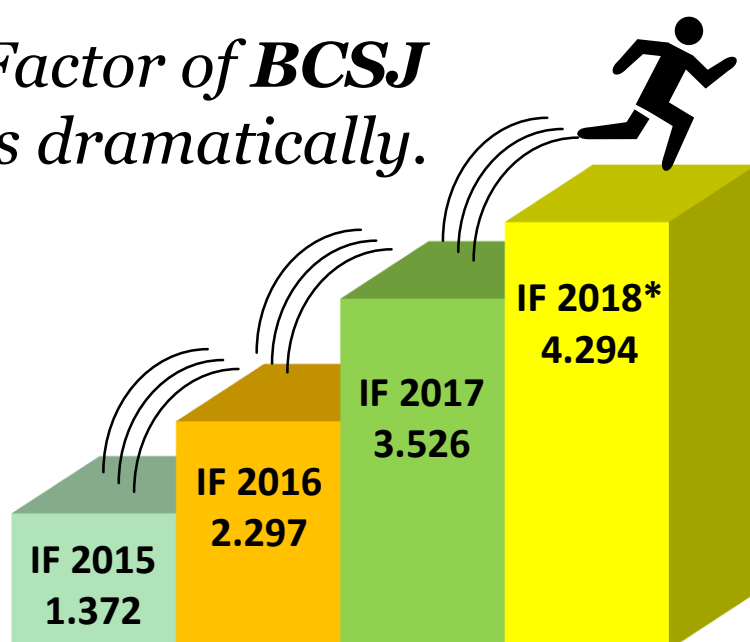
Bull. Chem. Soc. Jpn 2018, 91, 979-990.

<https://www.journal.csj.jp/doi/abs/10.1246/bcsj.20180042>



This paper reviews the recent research progress on the Si pillar assisted hierarchical three dimensional carbon nanotube structures focusing mainly on the rational modification of 3D network of single-walled carbon nanotube (3DNC) structure and its potential applications. We also introduce some synthetic studies of capillary force induced wall-shaped CNT structures on pillar substrates.

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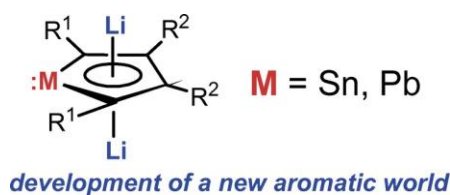
*Calculated on January 20, 2019
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Creation of Exotic π -Electron Systems by Introduction of Heavy Elements and Expansion of the Concept of Aromaticity

Masaichi Saito

Bull. Chem. Soc. Jpn. **2018**, *91*, 1009-1019.

<https://www.journal.csj.jp/doi/abs/10.1246/bcsj.20180047>



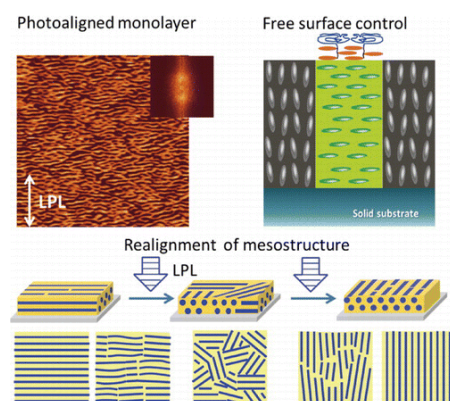
We succeeded in the expansion of the concept of aromaticity to tin- and lead-containing π -conjugated systems through the synthesis of dilithio-stannoles and a -plumbole. The combination of the aromatic dianionic ligands and transition metals produced unique electronic structures. These new findings would inspire a new chemical bond theory, materials science, and catalytic chemistry.

A Wide Array of Photoinduced Motions in Molecular and Macromolecular Assemblies at Interfaces

Takahiro Seki

Bull. Chem. Soc. Jpn. **2018**, *91*, 1026-1057.

<https://www.journal.csj.jp/doi/abs/10.1246/bcsj.20180076>



Photochromic molecules are embedded to such molecular assemblies to realize various motional functions from molecular levels to macroscopic material levels. This review focuses onto systems of intermediate feature size associated with interfaces, such as monolayers, thin polymer films including block copolymer and surface grafted chains, liquid crystals, polymer liquid crystals, liquid droplets, emulsions, small objects, nanofibers etc. A wide array of photoinduced motions are introduced focusing on the backgrounds and recent trends.

Lead Halide Perovskites in Thin Film Photovoltaics: Background and Perspectives

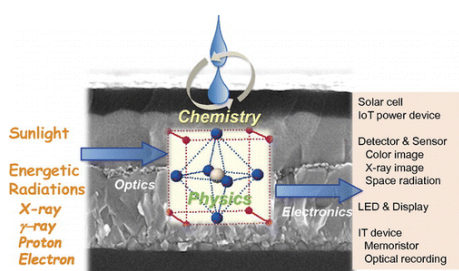
Tsutomu Miyasaka

Bull. Chem. Soc. Jpn. **2018**, *91*, 1058-1068.

<https://www.journal.csj.jp/doi/abs/10.1246/bcsj.20180071>



This review describes the background of our discovery of hybrid perovskite materials as photovoltaic absorbers and the progresses in high efficiency perovskite photovoltaics with focus on solution processes to control quality of polycrystalline layers and low temperature metal oxide preparation for fabrication of thin flexible devices. Future directions of research are discussed including the potential of efficiency enhancement to the Shockley–Queisser limit with single high-voltage devices and environmental issues and solutions towards industrialization of lead halide-based devices.

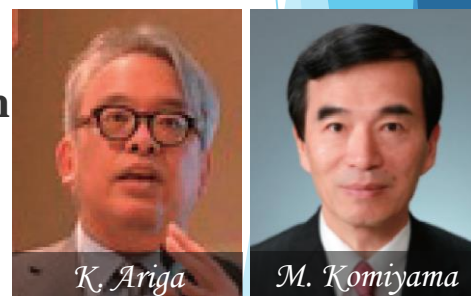


Molecular Imprinting: Materials Nanoarchitectonics with Molecular Information

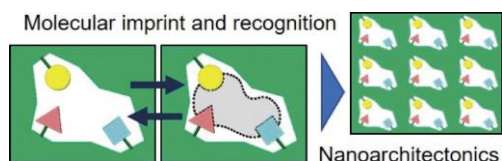
Makoto Komiyama,* Taizo Mori, and Katsuhiko Ariga*

Bull. Chem. Soc. Jpn. **2018**, *91*, 1075-1111.

<https://www.journal.csj.jp/doi/abs/10.1246/bcsj.20180084>



Molecular imprinting provides functional materials possessing molecular information within fabricated materials. Revisiting this concept with nanoarchitectonics would have great meaning in unification of the individual research disciplines into one key concept. In this review, we survey fundamentals and recent trends of molecular imprinting approaches upon consideration with nanoarchitectonics.



Soft, Wet and Ionic Microelectrode Systems

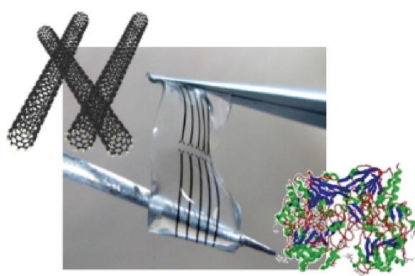
Matsuhiko Nishizawa

Bull. Chem. Soc. Jpn. **2018**, *91*, 1141-1149.

<https://www.journal.csj.jp/doi/abs/10.1246/bcsj.20180064>



We have developed organic electrodes that are soft and moist like biological systems. Their larger interfacial capacitance is of advantage for the low-invasive electrical stimulation of cells and tissues without cytotoxic faradaic reactions. Conducting polymer-based composite electrodes developed are useful for bioassay and medical treatments. Self-powered sensors and stretchable skin-patches were developed with enzyme-modified nanoengineered carbon electrodes.



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Development of Local Analysis Technique of Electric Double Layer at Electrode Interfaces and Its Application to Ionic Liquid Interfaces

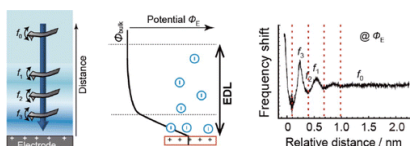
Ken-ichi Fukui

Bull. Chem. Soc. Jpn. **2018**, *91*, 1210-1219.

<https://www.journal.csj.jp/doi/abs/10.1246/bcsj.20180086>



Electrochemical frequency modulation AFM (EC-FM-AFM) enables local structural analyses of the electric double layer formed at charged electrodes. Depending on the electrode potential, structuring degree of electrolyte molecules, detected as the interfacial force modulation, reversibly changes.



Lipophilic Polyelectrolyte Gels and Crystal Crosslinking, New Methods for Supramolecular Control of Swelling and Collapsing of Polymer Gels

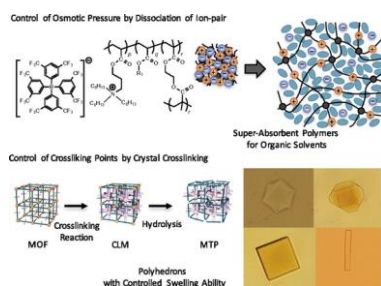
Kazuki Sada

Bull. Chem. Soc. Jpn. **2018**, *91*, 1282-1292.

<https://www.journal.csj.jp/doi/abs/10.1246/bcsj.20180096>



K. Sada



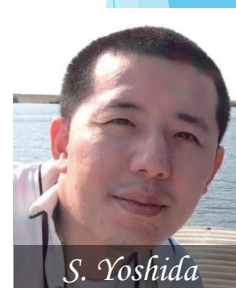
Swelling of the polymer gels is a characteristic property and fundamental for the smart materials. In this account, two approaches for the unique swelling ability are demonstrated; one is lipophilic polyelectrolyte gels with a high absorption capacity in organic solvents, and the other is the MOF template polymer gels with a controlled shape, size and crosslinking points by crystal crosslinking.

Controlled Reactive Intermediates Enabling Facile Molecular Conjugation

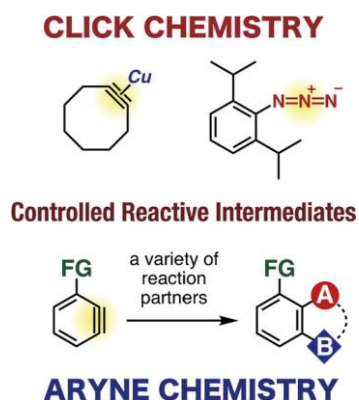
Suguru Yoshida

Bull. Chem. Soc. Jpn. **2018**, *91*, 1293-1318.

<https://www.journal.csj.jp/doi/abs/10.1246/bcsj.20180104>



S. Yoshida



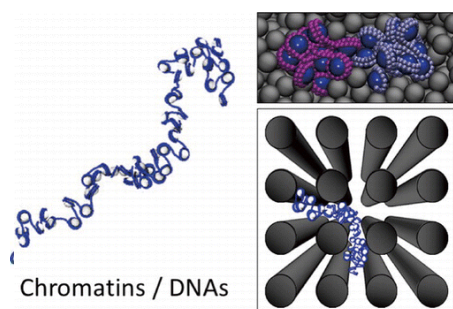
Reliable methods to conjugate molecules using highly reactive substrates including strained cycloalkynes, azides, and thiophene *S,S*-dioxides, or short-lived intermediates such as arynes and 6- and 7-membered cycloalkynes have been developed. This account describes our recent achievement on the development of facile methods to conjugating a wide variety of molecules based on the reactivity of controlled short-lived intermediates.

Macromolecular Crowding and Nanoscale Confinement on the Structural Regulation of Chromatins/DNAs

Jun Soo Kim

Bull. Chem. Soc. Jpn. **2018**, *91*, 1343-1350.

<https://www.journal.csj.jp/doi/abs/10.1246/bcsj.20180171>



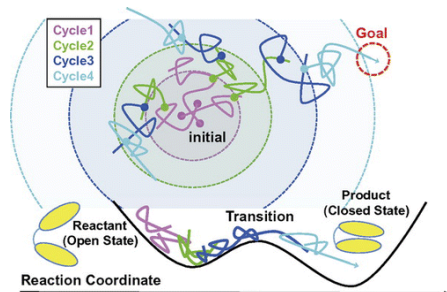
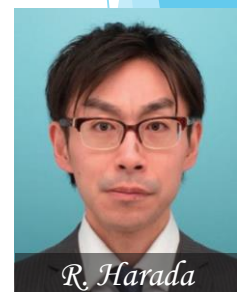
In silico investigations of chromatins/DNAs in crowded cell nucleus and in nanoscale confinement revealed that the structure of chromatins/DNAs can be regulated by controlling the degree of macromolecular crowding in cell nucleus or by elaborately designing the nanoscale confinement with appropriate dimension.

Simple, yet Efficient Conformational Sampling Methods for Reproducing/Predicting Biologically Rare Events of Proteins

Ryuhei Harada

Bull. Chem. Soc. Jpn. **2018**, *91*, 1436-1450.

<https://www.journal.csj.jp/doi/abs/10.1246/bcsj.20180170>



The concept of parallel cascade selection molecular dynamics (PaCS-MD). To promote conformational transitions from a given reactant to a product, cycles of conformational resampling consisting of (1) selections of initial structures and (2) restarting of short-time MD simulations are repeated. In PaCS-MD, structures close to the product are always selected and resampled by restarting of short-time MD simulations, making a transition to the product efficiently.

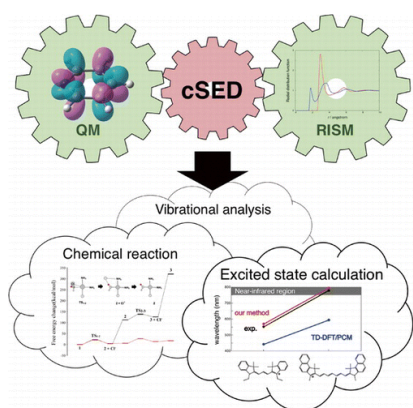
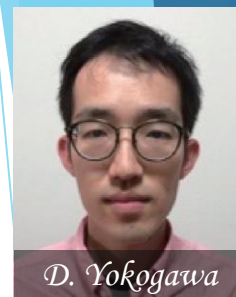
Vol. 91, No.10

New Generation of the Reference Interaction Site Model Self-Consistent Field Method: Introduction of Constrained Spatial Electron Density Distribution (cSED)

Daisuke Yokogawa

Bull. Chem. Soc. Jpn. **2018**, *91*, 1540-1545.

<https://www.journal.csj.jp/doi/abs/10.1246/bcsj.20180179>



We have developed a hybrid method between quantum mechanics (QM) and reference interaction site model (RISM). To combine RISM with QM calculations, we have to employ charge fitting approaches. By introducing constrained spatial electron density distribution (cSED) in the fitting, we developed a new generation of RISM self-consistent field. Our method (RISM-SCF-cSED) overcame the instability of the original RISM-SCF calculations.

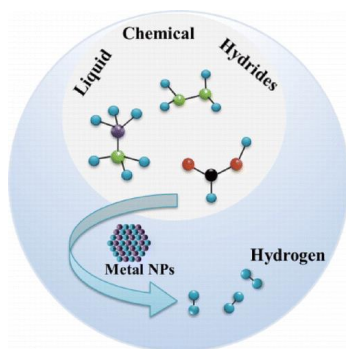
Vol. 91, No.11

Metal Nanoparticle-Catalyzed Hydrogen Generation from Liquid Chemical Hydrides

Shan Zhong and Qiang Xu*

Bull. Chem. Soc. Jpn. **2018**, *91*, 1606-1617.

<https://www.journal.csj.jp/doi/abs/10.1246/bcsj.20180227>



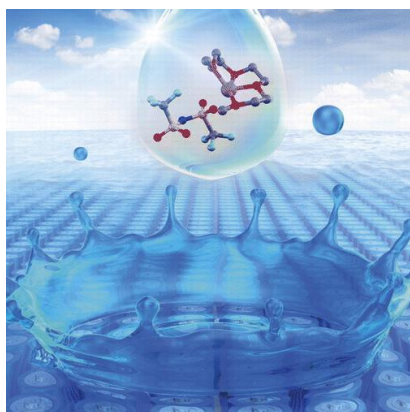
Hydrogen, as a clean and renewable energy carrier, has received much attention. This account summarizes the progresses on metal nanoparticle-catalyzed hydrogen generation reactions from liquid chemical hydrides (aqueous ammonia borane, hydrous hydrazine, and formic acid) under ambient conditions.

From Ionic Liquids to Solvate Ionic Liquids: Challenges and Opportunities for Next Generation Battery Electrolytes

Masayoshi Watanabe,* Kaoru Dokko, Kazuhide Ueno, and Morgan L. Thomas

Bull. Chem. Soc. Jpn. **2018**, *91*, 1660-1682.

<https://www.journal.csj.jp/doi/abs/10.1246/bcsj.20180216>



Glyme-Li salt solvate ionic liquids exhibit unique features as electrolytes, including the high thermal stability, enhanced oxidative stability, unique Li⁺ transport through ligand exchange, the inhibition of aluminum corrosion, poorly-solubilizing towards ionic electroactive materials, and electrochemical graphite intercalation reactions. These features greatly enhance the possibility for application of the solvate ionic liquids as next generation lithium battery electrolytes.

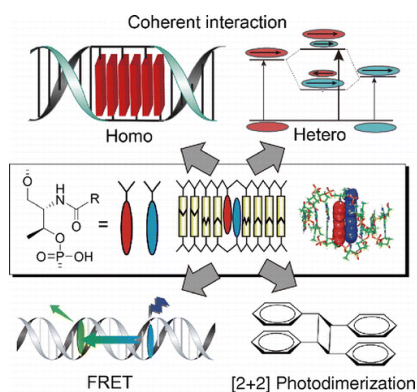
Vol. 91, No.12

The DNA Duplex as an Aqueous One-Dimensional Soft Crystal Scaffold for Photochemistry

Hiroyuki Asanuma,* Keiji Murayama, Yukiko Kamiya, and Hiromu Kashida

Bull. Chem. Soc. Jpn. **2018**, *91*, 1739-1748.

<https://www.journal.csj.jp/doi/abs/10.1246/bcsj.20180278>



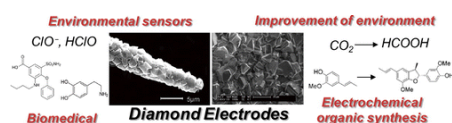
We developed a methodology for introduction of chromophores into a DNA duplex using D-threoninol as a linker. Chromophores can be introduced into the DNA duplex at any position and in any number. In this account, we describe use of this system in experimental verification of theoretical predictions in photochemistry.

Development of Electrochemical Applications of Boron-Doped Diamond Electrodes

Yasuaki Einaga

Bull. Chem. Soc. Jpn. **2018**, *91*, 1752-1762.

<https://www.journal.csj.jp/doi/abs/10.1246/bcsj.20180268>



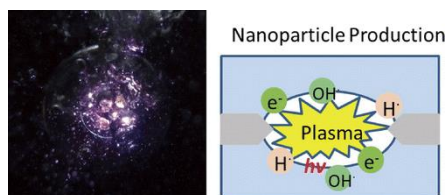
Boron-doped diamond (BDD) with high conductivity is attracting increasing attention as one of the next-generation of superior electrode materials. It can solve some of our environmental problems and improve our quality of life through use in biomedical devices.

Microwave-Induced Plasma-In-Liquid Process for Nanoparticle Production

Tetsu Yonezawa,* David Čempel, and Mai Thanh Nguyen

Bull. Chem. Soc. Jpn. **2018**, *91*, 1781-1798.

<https://www.journal.csj.jp/doi/abs/10.1246/bcsj.20180285>



We discuss the plasma-in-liquid process, especially the microwave-induced plasma-in-liquid process (MWPLP), for metal and metal oxide nanoparticle production. Various types of plasma systems have been employed to produce metal, alloy, and metal oxide nanoparticles with very short time. Detailed structural consideration of the obtained nanoparticles will also be discussed.

Account/Review for Materials Innovation
Bulletin of the Chemical Society of Japan



Nitish
Roy

Norihiro
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Akira
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