



The 7th Clayteam Seminar

Clayteam Poster Session List & Map

Time & Date: 16:15~18:00, Nov. 7, 2011

Venue: Multipurpose Room 11F, AIST Tokyo Waterfront



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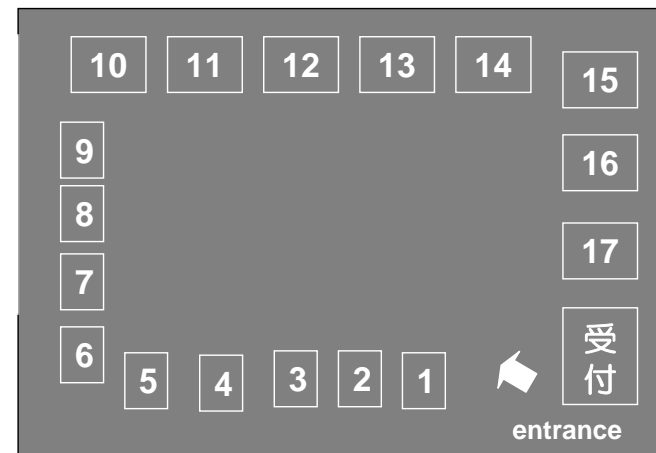
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No.	Title	Organization	Presented by	Abstract
1	Analysis of radical by using radical capturing clay sheet	Department of Advanced Materials Chemistry, Yokohama National University	Shintaro Komiya	One of the critical toxic components existed in the environment such as diesel exhaust particles (DEP) and reactive oxygen species (ROS) is said to be radical species. We have developed a new method to analyze reactive radicals in the environment by using "radical capturing sheet" in which radical trapping or radical scavenging reagents are intercalated in the clay layers. The identification and the amount of the radical species can be evaluated effectively with an aide of this "radical capturing sheet" by ESR methods or color-changes during the course of radical capturing process.
2	Surface Relief Patterning of Polybenzimidazoles	Department of Pure and Applied Chemistry, Faculty of Science and Technology, Tokyo University of Science	Motoshi Mino	Surface relief patterning or porous patterning of polybenzimidazole containing some additives was performed only by photoirradiation and thermal treatment without development. The profile depends on the additives, and so porous pattern or relief pattern can be controlled by the select of additives. The mechanism is thought to involve photo-thermal effect of the additives.
3	HPLC analysis and surface potential change in photopolymerization process for structured photovoltaic device	Tokyo Univ. of Sci. Yamashita labo. (Research position : RIKEN)	Masako Fukasawa	In the bulk heterojunction photovoltaic devices, it is important to control the donor and acceptor (D/A) spatial distribution. We have proposed a new type of bulk heterojunction photovoltaic device with grating structures induced by periodic photopolymerization. We have confirmed the enhanced photocurrent on the structured devices and the D/A spatial distribution induced by molecular migration with a Kelvin probe force microscopy (KPFM). In this presentation, we discuss the HPLC analysis and the surface potential change in the process of photopolymerization. In the HPLC experiment, photoreactions were observed in both of the donor and the acceptor. This result indicates that the photoreaction plays a role to make a spatial D/A distribution, in addition to the molecular migration induced by the periodic photopolymerization. On the other hand, the photoreaction under homogenous irradiation did not induce the surface potential change. This result confirms that the observed periodic surface potential is based on the D/A spatial distribution.
4	Photo-Optical Effect of PPV Derivatives and the Application	Department of Pure and applied Chemistry, Faculty of Science and Technology, Tokyo University of Science	Kota Shinohara	Distyrylarene derivatives are one of the molecules which have large two photon absorption cross-sections. We have prepared the distyrylarenes and the corresponding phenylene vinylene polymers (DEO-PPV) to investigate their refractive index change induced by photochemical reactions. The DEO-PPV shows extraordinary large refractive index induction by photo-irradiation as high as 0.7, or by electron beam irradiation as 0.1. The mechanism of the refractive index change is confirmed as photo induced oxidation of the samples.
5	Novel photo chemically induced function of polyimide	Department of Pure and applied Chemistry, Faculty of Science and Technology, Tokyo University of Science	Fumiaki Kodera	Polyimides (PI) have excellent properties such as thermo stability, mechanical strength, and chemical stability, which are widely used as the materials for microelectronics and aerospace. We have discovered novel process of surface relief patterning of PI without development process. Porous structure patterning of PI and surface free energy control of PI only by photoirradiation were also possible. Properties and mechanism of those photo-functionality will be described.
6	Inhomogeneous distribution of photochromic reaction of diarylethene derivatives in solid state PMMA	Department of Pure and Applied Chemistry, Faculty of Science and Technology, Tokyo University of Science	Toshihiko Kato	Free volume in polymer matrices has been determined with a photo-reactive probe technique by using various photochromic compounds in polymer matrices. Kinetics of photoreactions of diarylethene derivatives in methyl methacrylate polymer (PMMA) was investigated to determine inhomogeneous distribution of the solid state photochromic reaction. The quantum yield of the photoreaction from open-ring to close-ring isomer and the backward reaction were obtained by the changes in absorption during those photoreactions. The forward reaction is inhomogeneous due to the combined effect of the conformation distribution of diarylethene and the free volume of PMMA. On other hand, the back ward reaction is only affected by the size distribution of free volume
7	Preparation of Double-Network Gel containing Carbon nanotube	Department of Pure and applied Chemistry, Faculty of Science and Technology, Tokyo University of Science	Keisuke Suzuki	Novel liquid crystalline (LC) elastmer containing photochromic molecule whose form is changed by photo-irradiation has been studied. CNT has been hybridized into the LC elastomer to improve its mechanical properties. Those new gel materials with double network structure was successfully prepared.



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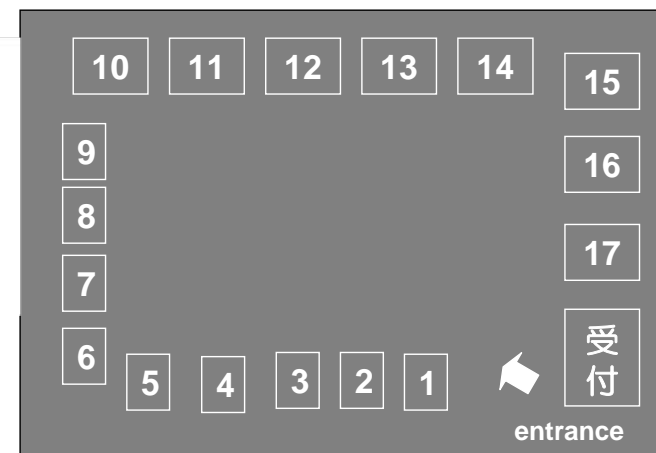
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8	Stir-induced chirality of solution containing achiral ionic oligomers	Department of Pure and Applied Chemistry, Faculty of Science and Technology, Tokyo University of Science	Masahiko Shigaki	Recently, we have found that chirality of an achiral ionic oligomer solution can be easily induced only by mechanical stirring, whose chirality can be successfully transferred to a guest molecule such as fluorescent dye to emit circularly polarized light. Ionic interaction between the ionic oligomer and the guest dye should be important. In this work we prepared various ionic oligomers containing different counter anions such as Cl ⁻ , I ⁻ and TFSI ⁻ , with different solubility. Stirring the oligomer solution with Cl ⁻ or I ⁻ ions exhibited CD signals to show chirality was induced and the CD signs change as stirring direction and rate.
9	Formation of a surface relief grating on films comprising a photochromic molecular motor	Department of Pure and Applied Chemistry, Faculty of Science and Technology, Tokyo University of Science	Shohei Ogino	Molecular motors are one of the photochromic molecules which rotate one way by photoirradiation and thermal treatment. We have prepared polymer films containing the molecular motors to generate surface relief grating (SRG) by the molecular motor motion upon photoirradiation. As irradiation of interfered light to the sample film, diffraction of probe beam was observed, showing SRG formation, which was confirmed by topological image of the sample by AFM measurement. The mechanism should involve mass migration induced by the photochromic reaction.
10	Immobilization of Phenyl Sulfonic Acid Group on a Layered Alkali Silicate, Octosilicate	Waseda University	Takanori Nakamura	Immobilization of sulfonic acid group on various solid has been examined for solid acid catalysts, proton conductor and ion exchanger. Using crystalline layered materials as scaffold, one can expect organized acidic group on the surface. In this work, we report the immobilization of phenyl sulfonic acid group on a layered alkali silicate, octosilicate (Na ₂ Si ₈ O ₁₇ ·nH ₂ O) of the layered silicate. The attachment was conducted by the silylation with phenyltrichlorosilane, phenylethyl(monomethyl)dichlorosilane and (p-trifluoromethyl)phenyltriethoxysilane and subsequent reaction with chlorosulfonic acid. The products were characterized of XRD, IR and NMR to show the successful attachment of sulfonic acid groups in the interlayer space of octosilicate.
11	Test Production and Evaluation of High Pressure Hydrogen Tank and Liquid Hydrogen Tank Made of Clay Film Compound CFRP	Kyusyu Institute of Technology	Atsutoshi Hiramatsu	Nowadays, the fuel cell vehicle is attractive as a new generation car which takes the place of a present gasoline car by the rise of consideration to the environment. Current high pressure hydrogen tanks for fuel cell vehicle consist of liners made of aluminum alloy with complete gas barrier characteristic or resin with good hydrogen gas barrier characteristics overwrapped and reinforced by CFRP layer using filament winding to withstand pressure. In our laboratory, the material that has high-specific strength and high gas barrier characteristics has been developed by compounding "Cleist" which is ceramics films that is developed by AIST (Advanced Industrial Science and Technology) and carbon fiber reinforced plastics (CFRP). As a result of hydrogen gas permeability tests, clay-film compound CFRP shown that the gas barrier performance was higher than that of current organic materials. This poster introduces test result about trial products high pressure hydrogen tank made of Clay-film compound CFRP. As for super high pressure hydrogen tank, the quantity of permeability was decreased to one quarter compared with current standard. And as another subject, this poster introduces about liquid hydrogen tank made of Clay-film compound CFRP having vacuum layer for heat insulation.



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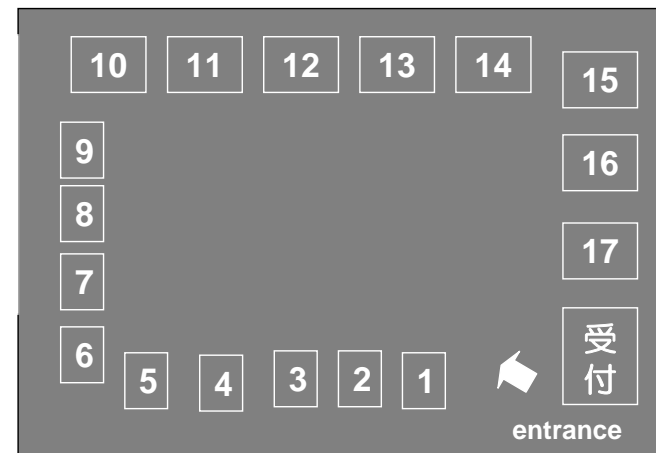
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12	Development of Translucent Glass Fiber Reinforced Plastics (GFRP) Provided Flame-retardant Property by Claist	National Institute of Advanced Industrial Science and Technology (AIST)	Takashi Nakamura	Glass Fiber Reinforced Plastics (GFRP) have been expected for fine materials applied to vehicles, airplanes, and building materials because GFRP are tough and lightweight. On the other hand, GFRP have a limitation in those usage due to the flammability equivalent to plastics. We developed clay-based film "Claist". Claist is non-combustible, and flexible. Moreover, it is possible to be transparent using synthetic smectite clay without any colored impurities. We will present our recent results collaborating with Miyagikasei Co. Ltd. concerning flame-retardant GFRP. The flame-retardant GFRP has a structure with a core GFRP plate coated by Claist.
13	Preparation and optimization of ZnO thin films using ion-beam sputtering and hydrothermal methods for LED applications	National Institute of Advanced Industrial Science and Technology (AIST)	S. Venkatachalam	In this paper, we report the preparation method of ZnO nanorod, nanotip, and nanoplatelets for HyleDs applications. Surface morphology of ZnO thin films clearly showed the formation of vertically aligned ZnO nanotips, nanoplatelets, nanonails and nanorods. The optical properties of ZnO thin films showed that the optical transparency of ZnO thin films is affected not only by film thickness, but also by secondary growth of ZnO nanorods. The optical transparency of the as-prepared ZnO thin film is calculated as 70 % for a film thickness of 2.76 mm. XRD patterns of all the ZnO thin films showed a main peak at 34.26°, which corresponds to (002) orientation, it is in good agreement with hexagonal phase of wurtzite-type ZnO. The best crystallinity is observed at an annealing temperature of 100° C. The strong intensity of the room temperature UV emission and weak intensity of green emission is attributed to the high purity with good crystallinity of ZnO nanorods. Finally, we discuss the possible factors that affect surface morphology, structural, optical, and electrical properties of nanostructured ZnO thin films.
14	ガス透過率測定装置 DELTAPERM	株式会社 テクノ・アイ	井口 恵進	このDELTAPERMは、5x10-5g/m2/day まで短時間に測定可能で、ハイバリアフィルムの水蒸気透過率測定器としては、国内実績No.1です。
15	Succeeds in developing the gasket product that leads to complete substitution of asbestos	Japanmatex.Co.,Ltd	Kasturo Tsukamoto	In a conventional non-asbestos sheet gaskets, sheet gaskets can be used from -240 °C to 550 °C high temperature is not cold. To announce the excellent sealing products corresponding to the temperature of these three. Clay (Claist)and expanded graphite consists of products, clear Matex 8131ND, clear rock 8851ND. Inorganic fibers and clay (Claist) will exhibit a series of new high-heat-resistant sheet gasket 1600ND decrypt the white.
16	クレーストコーティングによる柔軟なガスバリアフィルムの開発	大和製罐株式会社 容器商品開発部	山田 潤二	親水性の粘土と水溶性のプラスチックの混合ペーストをPETフィルム上に薄く塗布することで、高い酸素バリア性を持つ透明フィルムを開発した。このフィルムはガスバリア層が柔軟であることに加え、変形などによって生じたガスバリア層のキズも大気中の湿気を吸収して膨潤することで自己修復する為、くしゃくしゃにしても酸素ガスバリア性が従来品よりも容易に劣化しないことが特長である。
17	新規粘土フィルムの開発	住友精化株式会社	山本 琢司	住友精化は産業技術総合研究所・コンパクト化学システム研究センター・蛭名武雄チーム長との共同研究および東京理科大学・理工学部・山下俊准教授の技術指導の下、新規の粘土フィルムを開発しました。 この粘土フィルム(タフクレースト)は優れたガスバリア性と不燃性を有するクレーストの弱点であった機械的な脆弱さをカバーしたもので、クレーストに比較して飛躍的にハンドリング性能を向上させたものです。 クレーストと同様に熱的特性(低線膨張率、低熱収縮性、熱的繰返し法安定性)が良く、更に電気的特性(絶縁性、低誘電率)もより改善しています。 製造工程にも工夫して100 μm以上の厚みのある膜の製作も可能にしており、また積層化も可能であるため各種膜の有用な特性を多重的に付与することもでき、しかも層間は一体化し層間剥離等はほとんどありません。 今後は更に各種特長を向上させ、用途も広げていく予定です。