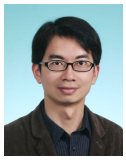
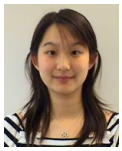
Day 1. June 24th, Friday	
Time	**Title/Speaker**
Opening Remarks	
09:45 - 09:55	**Dr. Junko Aimi** Senior Researcher, National Institute for Materials Science
09:55 - 10:00	**Prof. Chih-Ching Huang** Senior Vice President, National Sun Yat-Sen University
Session 1. Novel Trends in Polymer Syntheses **Chair: Dr. Junko Aimi, Prof. Shiao-Wei Kuo**	
10:00 - 10:25	 **Prof. Chi-How Peng** Assistant Professor, National Tsing Hua University **"Synthesis of Conjugated-unconjugated Block Copolymers via the Hybridization of CMRP and ATRP"** Cobalt mediated radical polymerization (CMRP) is famous by controlling the radical polymerization of unconjugated monomers such as vinyl acetate (VAc). Atom transfer radical polymerization (ATRP) can control the polymerization of conjugated monomers like methyl methacrylate (MMA) and styrene (Sty). The issue is that the conjugated and unconjugated monomers form the radicals with different stability during the polymerization and thus require different reagents to control the polymerization process. Recently we combined these two systems to overcome the barrier of the preparation of conjugated-unconjugated block copolymers and obtained the block copolymers of PVAc-*b*-PMMA and PVAc-*b*-PSty by a direct chain extension process.
10:25 - 10:50	 **Prof. Shingo Ito** Assistant Professor, The University of Tokyo **"Polymer Synthesis Based on Innovative Retrosynthesis"** Retrosynthesis (retrosynthetic analysis) is an indispensable concept in the planning of organic synthesis. However, the concept has rarely been applied to polymer synthesis. Here I introduce our research on the development of novel synthetic methods for functional organic polymers based on 'innovative retrosynthesis. This lecture includes 1) group 10 metal-catalyzed coordination–insertion copolymerization of olefins with polar monomers as a new '**retron**', 2) ping-pong polymerization employing hydro- formylation and allylboration as a new type of "**transform**" in polymer synthesis, and 3) palladium-catalyzed formal aryne polymerizations using a '**synthetic equivalent**' of arynes to form novel polymers containing *o*-arylene units in the main chain.
10:50 - 11:00	

11:00 - 11:25	 **Prof. Chih-Feng Huang** Associate Professor, National Chung Hsing University "**Controlled/Living Radical Polymerizations to the Preparations of Degradable Polymers and Functional Nanomaterials**" Controlled/living radical polymerizations (CRPs) include ATRP, NMRP, RAFT polymerization and so on. Firstly, we utilize ATRP to control polymer topology. We propose simple methodologies by tuning the catalyst phase homogeneity and monomer structures to obtain unprecedented branched, block, or aliphatic polyesters. These new type of polymers can introduce with various functionalities depending on the targets of practical applications. Secondly, the surface modifications/CRPs were applied to nanomaterials toward the applications of high efficient adsorbents.
11:25 - 11:50	 **Dr. Kazunori Sugiyasu** Senior Researcher, National Institute for Materials Science "**Conjugated Polymers Sheathed with Designer Side Chains**" Conjugated polymers (CPs) are often referred to as molecular wires because of their quasi one-dimensional electronic wavefunctions delocalized along the polymer chains. However, in the solid state, CPs tend to self-assemble through π-stacking, which greatly attenuates the one-dimensional nature. By molecular design, CPs can be molecularly insulated just like electric power cords, resulting in so-called “insulated” molecular wires (IMWs). In this talk, I will discuss unique photophysical, electronic, and mechanical properties of IMWs which originate from the absence of π-stacking (*Chem. Asian J.* **2015**, *10*, 1820).
11:50 - 12:15	 **Prof. Yen-Ju Cheng** Professor, National Chiao Tung University "**Design and Synthesis of Organic and Polymeric Conjugated Materials for Organic Photovoltaics and Transistors**" Forced planarization by covalently fastening adjacent aromatic units in the polymer backbone strengthens the parallel p-orbital interactions to elongate effective conjugation length and facilitate electron delocalization, providing an effective way to reduce the band gap and enhances the intrinsic charge mobility. It is envisaged that the well-defined ladder-type small molecules can function as donor monomers to polymerize with acceptor units, leading to a new class of donor-acceptor semi-ladder copolymers that can be suitably used for solution-processable polymer solar cells. A series of donor-acceptor conjugated copolymers have been designed and synthesized by facile methodologies. The applications of these polymers in bulk-heterojunction solar cells and OFET transistors will be presented.
12:15 - 13:25	**Lunch Break**

Session 2. Nano Space Organic/Inorganic Materials Chair: Dr. Kazunori Sugiyasu, Prof. Chih-Feng Huang	
13:25 - 13:50	 **Prof. Kevin C. -W. Wu** Associate Professor, National Taiwan University "**Synthesis of Functional Nanoporous Materials for Energy Applications**" Nanoporous materials can be classified into three categories according to their pore size: microporous (or metal-organic frameworks (MOFs) in this study) (< 2 nm), mesoporous (2 – 50 nm), and macroporous (> 50 nm). These nanoporous materials exhibit high surface areas, controllable morphology (nanoparticle and thin films), and tunable surface functionalities (amino group, thiol group, carboxylic group); therefore, they show great potential in many fields such as adsorption, separation and catalysis. In this talk, I will first describe how we can synthesize functional nanoporous materials with pore sizes in the range of micro-, meso-, and macropores. I will then demonstrate several potential energy-related applications using synthesized nanoporous materials. For energy storage, I will introduce RuO_x-loaded mesoporous silica nanoparticles for supercapacitors and mesoporous TiO_2 nanoparticles for dye-sensitized solar cells (DSSCs). For energy saving, I will demonstrate metal-organic frameworks (MOFs)-based mixed matrix membranes (MMM) for pervaporation of ethanol/water mixture. For bio-renewable energy, I will describe how we synthesize a series of biological and chemical mesoporous materials-based heterogeneous catalysts for dimethylfuran (DMF) production from lignocellulosic biomass.
13:50 - 14:15	 **Prof. Satoshi Horike** Assistant Professor, Kyoto University **Molecular Motions in Metal Organic Framework for Solid State Ionics and Glass Chemistry** Metal organic framework (MOF) is composed by metal ions and bridging ligands and they have extended and crystalline architecture. We are interested in how to incorporate the dynamic molecular components in MOFs and to have unique solid state functionality. Here we present the synthetic approaches of proton conductive MOFs having very fast proton carrier motions in crystals,[1] and glassy state of MOFs by strong disordering of metal-ligand networks.[2] We also discuss the potential of such ion conductive MOFs for fuel cell technology, and glassy transparent MOFs for optical/physical properties. [1] S. Horike, D. Umeyama, S. Kitagawa, *Acc. Chem. Res.* **2013**, *46*, 2376-2384. [2] W. Chen, S. Horike, D. Umeyama, N. Ogiwara, T. Itakura, C. Tassel, Y. Goto, H. Kageyama, S. Kitagawa, *Angew. Chem. Int. Ed.* **2016**, *55*, 5195-5200.

14:15 - 14:40	 **Prof. Yasuhide Inokuma** Associate Professor, Hokkaido University "**Development of New Crystalline Sponges for Structure Analysis**" The crystalline sponge method is recently developed technique for single crystal X-ray analysis of non-crystalline compounds on a nanogram-to-microgram scale using porous crystals as host crystalline sponges. While this method can solve the critical problems of crystallization, scope of application is still limited because every crystalline sponges has 'likes and dislikes'. Therefore, development of new and target-oriented crystalline sponges is essential to generalize the crystalline sponge method. In our recent research, new crystalline sponges have been developed in two different ways: (1) database search using Cambridge Structural Database by applying empirical search qualification, and (2) synthesis of original porous hosts based on host-guest design. Structural analysis of non-crystalline compounds using new crystalline sponges will also be demonstrated in my talk.
14:40 - 15:05	 **Prof. Nobuhiro Yanai** Associate Professor, Kyushu University "**Photon Upconverting Molecular Assemblies**" We show exciting research opportunities when the concept of molecular self-assembly meets photon upconversion (UC) based on triplet-triplet annihilation (TTA). In dense dye assemblies, triplet excitons can efficiently migrate and annihilate. The control over their assembly structures allows for maximum upconversion quantum yield at weak solar irradiance that has never been achieved by the conventional molecular diffusion-based mechanism. The introduction of the ''self-assembly'' concept offers a new perspective in photon upconversion research and triplet exciton science, which show promise for numerous applications ranging from solar energy conversion to chemical biology.
15:05 - 15:20	**Coffee Break**

Session 3-1. Structures and Properties of Sustainable Polymer Materials Chair: Dr. Sadaki Samitsu, Prof. Kevin C. -W. Wu	
15:20 - 15:45	 **Prof. Takahiro Muraoka** Assistant Professor, Tokyo Institute of Technology "**Bio-inspired Multi-block Molecules**" Multi-block amphiphiles consisting of iterative hydrophilic PEG chains and hydrophobic aromatic moieties form folded conformations by an intramolecular interactions in aqueous media. Such foldamers are inserted into a bilayer membrane to form supramolecular ion channels. By an elaborate design with a ligand-binding pocket, reversible ligand-gated opening and closing of the channels were successfully demonstrated. (*Chem. Commun.* **2011**, *JACS* **2012**, *JACS* **2014**) The multi-block amphiphiles also allow for the formation of thermosalient single-crystals. A macrocyclic multi-block amphiphile forms needle-shaped single-crystals, which shows thermo-triggered macroscopic bending motion with a reversible manner (*Angew. Chem.* **2014**).
15:45 - 16:10	 **Prof. Jeng-Shiung Jan** Associate Professor, National Cheng Kung University "**Polypeptide-Based Assemblies for Drug and Protein Encapsulation**" Nanomaterials self-assembled from amphiphilic copolymers are of great importance due to their potential applications in nano- and biotechnology. Various self-assembled structures such as vesicles and micelles can be prepared by controlling the composition, structure, and function of these copolymers. Among them, polypeptide-based copolymers recently have attracted increasing interest due to their biodegradability, biocompatibility, ordered chain conformation, stimuli-responsiveness, and possibly biological functions. Herein, we report the synthesis and self-assembly of various polypeptide-based copolymers in solution and evaluating their potential applications as encapsulants and carriers. The structure and size of these assemblies were determined by the chain composition and conformation, as well as the amphiphilic nature of these copolymers. The preliminary evaluation of these polypeptide-based assemblies for in vitro drug release and protein encapsulation suggested that they hold promise as drug carriers, functional nanobioreactors, and biomimetic encapsulants.

16:10 - 16:35	 **Prof. Jane Wang** Assistant Professor, National Tsing Hua University **"Synthesis and Construction of Biodegradable Polymer-Mineral Composite Bone Substitute"** To repair bone defects resulting from the two diseases, large amounts of bone grafts are often required. For optimal osteogenesis, ideal synthetic bone grafts (i.e. bone substitutes) require osteoconductivity, osteoinductivity along with appropriate mechanical properties for structural support. In this work, hydroxyapatite (HAP), a biocompatible mineral, is mixed with poly(glycerol sebacate) (PGS), a glycerol-based novel biodegradable polymer with tunable mechanical and degradation properties. The development of two novel types of porous biodegradable composite scaffolds for bone tissue regeneration from PGS/HAP with mechanical, degradation and cell toxicity characterization. Preliminary animal model also showed great biocompatibility along with promising clinical application.
16:35 - 17:00	 **Prof. Chia Chen Wang** Assistant Professor, National Sun Yat-Sen University "**VUV Photoelectron Spectroscopy of Aqueous Nanoaerosols: Implications in the Biological and Environmental Sciences**" The crucial roles of aerosols have been increasingly recognized in a variety of important fields, encompassing the atmospheric chemistry, the environmental science and the planetary science. To probe the valence electronic structure of aerosols, which decisively determines their chemical activities, an aerosol VUV photoelectron spectroscopy apparatus is recently developed. Efforts have been focused on studying aqueous nanoaerosols. This novel aerosol apparatus readily creates a microscopic aqueous environment, allowing one to interrogate the hydrated structure of biologically important materials and extract information that can only be accessed under aqueous conditions, such as the solvent effect, pH effect and the solvent-solute interaction.
17:00 - 19:00	***Poster Presentation & Banquet***

Day 2. June 25th, Saturday	
Session 3-2. Structures and Properties of Sustainable Polymer Materials **Chair: Prof. Jem-Kun Chen**	
09:00 - 09:25	 **Dr. Sadaki Samitsu** Senior Researcher, National Institute for Materials Science "**New Concepts on Creating Nanopores: Mesoporous Polymers and Carbon-Based Reverse-Osmosis Membranes**" Nanoporous polymers have been industrially used in valuable products such as large-scale separator sheet of Li-ion batteries, hollow fiber membranes for medical usage, and high-performance membrane and adsorbent for gas and water purification. New development of fabrication methodology of nanoporous polymers is therefore a key challenge that will make it possible to launch new applications. Here we will present new concepts of nanoporous polymer fabrication. One is phase separation method using nanocrystallization of solvent molecules, which provides mesoporous polymers of commodity polymers. The other is precisely-controlled plasma-enhanced chemical vapor deposition method by which we could fabricate hydrophilic carbon-based reverse-osmosis membranes for water desalination.
09:25 - 09:50	 **Prof. Ya-Sen Sun** Associate Professor, National Central University "**Block Copolymer-Templated Carbon Nanostructures for Molecular Sensing**" We fabricated three-dimensional hierarchical porous carbon (3D-HPC) with an interconnected network structure and with nitrogen-rich functional groups through a pyrolysis procedure of multiple layers of closely-packed diblock copolymers micelles. The resultant 3D-HPC with a considerable specific surface area serves as an excellent substrate for surface-enhanced Raman spectroscopy (SERS), coupled with fluorescence quenching, for sensing of adsorbed dye molecules. The abundant nitrogen atoms terminated on the surface of 3D-HPC nanostructures play a critical role in promoting large chemical enhancement generated via charge transfer and dipole-dipole interactions. Most importantly, the observed enhancement factors show clear dependence on the mesoscaled porosity within 3D-HPC, indicating that the chemical enhancement can be steadily tuned by controls over interfacial areas as a function of nanosphere size and packing density. The unique architecture of 3D-HPC based on the construction of a well-defined core-shell nanosphere network building block provides a new design strategy for fabricating SERS substrates.

09:50 - 10:15	 **Prof. Yeo-Wan Chiang** Associate Professor, National Sun Yat-Sen University "**Photonic Crystals from Self-assembly of High-Mw Block Copolymers**" Photonic crystals from self-assembly of high-molecular-weight (high-Mw) block copolymers (BCPs) exhibit unique solvatochromism-dependent red- and blue-shift reflective bands using a neutral solvent as a stimulus. At low polymer concentration, red-shift of the reflectivity was attributed to the increase of BCP long period by the enhancement of the BCP segregation strength. At high polymer concentration, the blue-shifting reflectivity resulted from the decrease of the BCP long period by the collapse of polymer chains. The rapid fabrication of large-area photonic thin films is carried out using extremely low-vapor-pressure solvents for casting. Taking advantage of the photo-induced crosslinking characteristics of the constituted blocks toward UV irradiation, a well-defined photopatterned thin film photonic crystal was carried via masking.
10:15 - 10:30	**Coffee Break**
Session 4. Organic Devices **Chair: Prof. Yen-Ju Cheng, Prof. Yasuhide Inokuma**	
10:30 - 10:55	 **Dr. Junko Aimi** Senior Researcher, National Institute for Materials Science "**Functional Polymer Design for Nonvolatile Memory Devices**" Organic nonvolatile memory is advanced topics in electronics applications due to the increasing demand for wearable data storage. Among various device architectures of organic memory, organic field-effect transistors (OFETs) with a nano floating gate are widely used as promising trends. The key for achieving high device performance is the preparation of nano floating gate structures with controlled sizes and spatial distributions in dielectric layer. In this study, we synthesized well-defined star-shaped polymers featuring a metal phthalocyanine core, and investigated their applicability for nano floating gates. The design of the topological polymer with π-molecule can be a promising candidate for nano floating gates in nonvolatile organic memory devices.

10:55 - 11:20	 **Prof. Cheng-Liang Liu** Assistant Professor, National Central University "**Spray-coating Technique for Electronic and Optoelectronic Application**" Solution-processing is the most appealing aspect of electronics/opelectronics devices. The prossiblity of printing low-cost, lightweight and efficient organic electronics devices is the commonly accepted paradiam associated with printable materials deposited as inks using solution-processing techniques. In addition to inkjet printing and slot-die coating, spray-coating technique is widely accepted in the industrial world as one of the suitable coating thin layers onto virtually any kind of substrate. Here, we present the basic princples governing the morphologies of spray-coated films and state-of-art applications of spray-coating for builiding up organic electronic devices, including organic transisors, solar cells, electrochromic devices and photoelectrochemical cells, etc.
11:20 - 11:45	 **Dr. Takeshi Yasuda** Principal Researcher, National Institute for Materials Science "**Effects of Purity and Molecular Weight of Amorphous Conjugated Polymers on Photovoltaic Performances**" Power conversion efficiencies (PCEs) of polymer-based bulk heterojunction (BHJ) organic photovoltaics (OPVs) have continued to grow over the past several years, up to 10%. In this study, amorphous conjugated polymers (PEDOTFs) with different terminal structures, the amount of residual Pd, and the molecular weights were synthesized by direct arylation polycondensation of 3,4-ethylenedioxythiophene with 2,7-dibromo-9,9-dioctylfluorene. Then, we systematically elucidated the effects of the terminal structure, amount of residual Pd catalyst, and molecular weight of the polymer on BHJ OPV performances. Among the three factors, the Br-terminal structure is the dominant factor that can be modified to improve the PCE, in this case, from 2.9% to over 4%.

11:45 - 12:10	 **Prof. Jem-Kun Chen** Professor, National Taiwan University of Science and Technology "**Bifunctional Superparamagnetic–luminescent Core–shell–satellite Structured Microspheres: Preparation, Characterization, and Magnetodisplay Application**" We present a general process that allows the convenient production of bifunctional superparamagnetic–luminescent composite particles (CPs) by the direct self-assembly of nanoparticles on host 3 mm silicon oxide microspheres (SiMS). The core–shell–satellite structured SiMS@FeNPs@CdTe CPs retain their original properties including highly efficient superparamagnetism and luminescence. A home-made transparent sandwich device with solenoid coils (TSDSC) containing the aqueous dispersions of these CPs was used to observe reversible magnetically responsive transmittance and luminescence. The results suggest that the specific superparamagnetism and luminescence of nanoparticles can be efficiently endued on microscale particles.
Closing Remarks	
12:10 - 12:15	**Prof. Shiao-Wei Kuo** Professor, National Sun Yat-Sen University