German-Japanese Workshop

“Aquatic Materials Made to Order”

March 4 & 5, 2020

Heidelberg University (Germany)

Jointly Organized by

MEXT Grant-in-Aid for Scientific Research on Innovative Areas

“*Aquatic Functional Materials*”

&

German Excellence Cluster

“*3D Matter Made to Order*”

Aquatic Functional Materials

MEXT Grant-in-Aid for Scientific Research on Innovative Areas
Project Leader: Takashi Kato
Area Number: 6104, FY2019-FY2023

3D MATTER MADE TO ORDER

Germany’s Excellence Strategy
- 2082/1 – 390761711
Spokespersons:
Martin Wegener and Uwe Bunz

German-Japanese Workshop
"Aquatic Materials Made to Order"

March 4 & 5, 2020, Heidelberg, Germany

March 4

9:30 Welcome / Motomu Tanaka

Introduction of Center Projects in Germany and Japan

9:45 – 10:15 Martin Bastmeyer (Karlsruhe Institute of Technology)
"3D Matter Made to Order"

10:15 – 10:30 Takashi Kato (The University of Tokyo)
"Aquatic Functional Materials"

Session 1: Material Design and Synthesis

10:30 – 11:00 Takashi Kato (The University of Tokyo)
"Self-Assembled Materials for Environmental Benignancy and Active Functions"

Break

11:15 – 11:45 Michael Mastalerz (Heidelberg University)
"Shape-Persistent Organic Cages Based on Triptycene and Tribenzotriquinacene"

11:45 – 12:15 Hayato Tsuji (Kanagawa University)
"Highly Luminescent and Stable Hydrocarbon Molecules Featured by Intramolecular Carbon-Bridging Structure in Oligo(phenylenevinylene)"

Lunch

13:30 – 14:00 Eva Blasco (Karlsruhe Institute of Technology)
"Advanced Polymer Materials for 3D Laser Micro- and Nanoprinting"

14:00 – 14:20 Kazuki Fukushima (The University of Tokyo)
"Functionalized Aliphatic Polycarbonates towards Biodegradable Biomaterials"

14:20 – 14:50 Christof Wöll (Karlsruhe Institute of Technology)
"Metal-Organic Framework-Templated Coatings for Biological and Biomedical Applications: Synthesis Strategies, Characterization, and Applications"

Break

Session 2: Characterization and Modeling

15:10 – 15:40	Yoshihisa Harada (The University of Tokyo) "X-Ray Structural Analyses of Interfacial Water and Its Role on the Materials Function"
15:40 – 16:00	Wasim Abuillan (Heidelberg University) "Size, Shape, and Correlation of Self-Assembled Nanodomains at the Air/Water Interface by Quantitative Grazing Incidence Small-Angle X-Ray Scattering"
16:00 – 16:30	Hideki Seto (High Energy Accelerator Research Organization (KEK)) "Dynamical Behavior of Hydration Water at Biocompatible Materials"
16:30 – 18:00	Poster Session

Dinner

March 5

Session 2: Characterization and Modeling (continued)

9:00 – 9:30	Hitoshi Washizu (University of Hyogo) "Molecular Simulation Approach for Water on Surfaces"
9:30 – 9:50	Go Watanabe (Kitasato University) "Molecular Dynamics Study of Biomolecular Adsorption onto Langmuir Monolayers of Bioconjugated Amphiphilic Mesogens"

Break

Session 3: Applications of Aquatic, 3D Materials

10:10 – 10:40	Martin Bastmeyer (Karlsruhe Institute of Technology) "Cell Mechanics in Geometrically Defined 3D-Environments"
10:40 – 11:00	Masaki Nakahata (Osaka University) "Design and Synthesis of Bioinspired Smart Polymers for Biomaterials and Environment Sensing"

Break

11:15 – 11:45	Masaru Tanaka (Kyushu University) "Design of Polymeric Biomaterials: The "Intermediate Water Concept""
11:45 – 12:15	Yoshinori Takashima (Osaka University) "Supramolecular Polymeric Materials Functionalized by Host-Guest Interactions and Its Stimuli-Responsive Properties"
12:15	Final Remarks / Takashi Kato

Poster Presentations

1. Kazuki Fukushima (Department of Chemistry and Biotechnology, School of Engineering, The University of Tokyo, Japan)

   "Functionalized Aliphatic Polycarbonates towards Biodegradable Biomaterials"

2. Kei Nishida[1], Hiroki Uehara[1,2], Takahisa Anada[1,2], Shingo Kobayashi[1], Masaru Tanaka[1,2] ([1]Institute for Materials Chemistry and Engineering, Kyushu University, Japan. [2]Department of Applied Chemistry, Graduate School of Engineering Kyushu University, Japan)

   "Emerging Attractive Interaction of Biocompatible Aquatic-Materials with Plasma Membrane"

3. Lena Pilz, Nida Ük (Institute of Functional Interfaces, Karlsruhe Institute of Technology, Germany)

   "Algorithms and Artificial Intelligence for Verification of Synthesis Parameters at Microwave Assisted Synthesis of Uio-66 and Zif-8"

4. Soh Kushida[1,2], Uwe H. F. Bunz[1,2] ([1]Organisch-Chemisches Institut, Heidelberg University, Germany. [2]CAM, Heidelberg University, Germany)

   "π-ion Gel Transistors"

5. Manuel Tsotsalas[1,2] ([1]Institute of Functional Interfaces, Karlsruhe Institute of Technology, Germany. [2]Institute of Organic Chemistry, Karlsruhe Institute of Technology, Germany)

   "Taylor-Made Organic Biomaterials"

6. Toshiki Sonoda[1], Shingo Kobayashi[2], Masaru Tanaka[2] ([1]Depertment of Applied Molecular Chemistry, Graduated School of Kyushu University, Japan. [2]Institute for Materials Chemistry and Engineering, Kyushu University, Japan)

   "Effect of Side-Chain Spacing of Poly(2-Methoxyethyl Acrylate) on Hydration States"

7. Kosuke Yamazoe[1,2], Yuji Higaki[3,4], Yoshihiro Inutsuka[3], Jun Miyawaki[1,2], Yi-Tao Cui[1], Atsushi Takahara[3,4], Yoshihisa Harada[1,2] ([1]Institute for Solid State Physics, The University of Tokyo, Japan. [2]Department of Advanced Materials Science, Graduate School of Frontier Sciences, University of Tokyo, Japan. [3]Graduate School of Engineering, Kyushu University, Japan. [4]Institute for Materials Chemistry and Engineering, Kyushu University, Japan)

   "Hydrogen-Bonding Network of Water in a Polyelectrolyte Brush"

8. Naoya Kurahashi[1], Ken-ichi Ogu[2], Masahiro Rikukawa[2] ([1]Institute for Solid State Physics, University of Tokyo, Japan. [2]Faculty of Science and Engineering, Sophia University, Japan)

   "Pulsed Field Gradient NMR and Spin Relaxation Time Measurements in Polymer Electrolyte Membranes: Analysis of Water Diffusion Behavior"

9. Yoshiki Ishii[1], Go Watanabe[2], Nobuyuki Matubayasi[3], Takashi Kato[4], Hitoshi Washizu[1] ([1]Graduate School of Simulation Studies, University of Hyogo, Japan. [2]Department of Physics, School of Science, Kitasato University, Japan. [3]Division of Chemical Engineering, Graduate School of Engineering Science, Osaka University, Japan. [4]Department of Chemistry and Biotechnology, School of Engineering, The University of Tokyo, Japan)

   "Molecular Modeling of Functional Ionic Liquid Crystal: Structural and Hydration Properties"

10. Daiki Murakami[1], Yoshihisa Fujii[2], Taiki Tominaga[3], Hideki Seto[4], Masaru Tanaka[1] ([1]IMCE/Graduate School of Engineering, Kyushu University, Japan. [2]Faculty of Engineering, Mie University, Japan. [3]Neutron Science and Technology Center, CROSS, Japan. [4]IMSS/J-PARC, High Energy Accelerator Research Organization, Japan)

    "Dynamical Behavior of Non-Freezing/Intermediate/Free Water in a Biocompatible Polymer Matrix"

11. Wasim Abuillan (Heidelberg University, Germany)

    "Size, Shape, and Correlation of Self-Assembled Nanodomains at the Air/Water Interface by Quantitative Grazing Incidence Small-Angle X-Ray Scattering"

12. Kenji Yamaoka, Yoshihisa Fujii, Naoya Torikai (Department of Chemistry for Materials, Graduate School of Engineering, Mie University, Japan)

    "Rheological Analysis of Gelation Behavior for Methylcellulose Aqueous with Quartz Crystal"

13. Yusuke Sakamaki[1], Akihisa Yamamoto[2], Wasim Abuillan[1], Tetsuhiko Teshima[3], Yoko Ueno[3], Motomu Tanaka[1,2] ([1]Physical Chemistry of Biosystems, Heidelberg University, Germany. [2]Center for Integrative Medicine and Physics, Kyoto University, Japan. [3]NTT Basic Research Laboratories, Japan)

    "Vertical Structure of DNA-Tethered Membranes"

14. Go Watanabe[1], Hiroki Eimura[2], Nicholas L. Abbott[3], Takashi Kato[2] ([1]Department of Physics, School of Science, Kitasato University, Japan. [2]Department of Chemistry and Biotechnology, School of Engineering, The University of Tokyo, Japan. [3]Department of Chemistry and Biomolecular Engineering, Cornell University, USA)

    "Molecular Dynamics Study of Biomolecular Adsorption onto Langmuir Monolayers of Bioconjugated Amphiphilic Mesogens"

15. Julian Czajor[1], Wasim Abuillan[1], Delphine Felder-Flesch[2], Tomohiro Hayashi[3], Motomu Tanaka[1,4] ([1]Physical Chemistry of Biosystems, Institute of Physical Chemistry, Heidelberg University, Germany. [2]Institute de Physique et Chimie des Matériaux de Strasbourg, France. [3]Material Science and Engineering, Tokyo Institute of Technology, Japan. [4]Center for Integrative Medicine and Physics, Institute for Advanced Study, Kyoto University, Japan)

    "Physical Characterization of Dendrimer Functionalized Metal Oxide Surfaces for Medical Applications"

16. Ryusuke Watanabe[1], Takeshi Sakamoto[2], Kosuke Yamazoe[3], Jun Miyawaki[3], Takashi Kato[2], Yoshihisa Harada[3] ([1]Department of Advanced Materials Science, Graduate School of Frontier Sciences, The University of Tokyo, Japan. [2]Department of Chemistry and Biotechnology, School of Engineering, The University of Tokyo, Japan. [3]Institute for Solid State Physics (ISSP), The University of Tokyo, Japan)

    "Transport Mechanism of Sub-Nanoporous Liquid-Crystalline Membranes Based on the Hydrogen-Bonded Structure of Water"

17. Yuji Higuchi (Institute for Solid State Physics, The University of Tokyo, Japan)

    "Large Deformation of Polymeric Materials and Biomolecules by Coarse-Grained Molecular Dynamics Simulations"

18. Yuka Ikemoto (Multimodal Spectroscopy Team, Spectroscopic Analysis Group, Spectroscopy and Imaging Division, Japan Synchrotron Radiation Institute, Japan)

    "Synchrotron Radiation Infrared Microspectroscopy under Various Controlled Environments"

19. Bahereh Ebrahimi Pour[1], Sven Mehlhose[1], Martin Eickhoff[2], Sohei Kumagai[3], Toshihiro Okamoto[3], Hayato Tsuji[4], Motomu Tanaka[1,5] ([1]Physical Chemistry of Biosystems, Heidelberg University, Germany. [2]Institute of Solid State Physics, Bremen University, Germany. [3]Department of Advanced Materials Science, University of Tokyo, Japan. [4]Department of Chemistry, Kanagawa University, Japan. [5]Center for Integrative Medicine and Physics, Institute for Advanced Study, Kyoto University, Japan)

    "Membrane-Based Charge Sensors on GaN and Organic Semiconductors"

20. Masaki Nakahata (Graduate School of Engineering Science, Osaka University, Japan)

    "Design and Synthesis of Bioinspired Smart Polymers for Biomaterials and Environment Sensing"

21. Sven Mehlhose[1], Shunsaku Kimura[2], Takeshi Sakamoto[3], Takashi Kato[3], Martin Eickhoff[4], Motomu Tanaka[1,5] ([1]Physical Chemistry of Biosystems, Heidelberg University, Germany. [2]Department of Material Chemistry, School of Engineering, Kyoto University, Japan. [3]Department of Chemistry and Biotechnology, School of Engineering, University of Tokyo, Japan. [4]Institute of Solid State Physics, Bremen University, Germany. [5]Center for Integrative Medicine and Physics, Institute for Advanced Study, Kyoto University, Japan)

    "Surface Dipole Engineering and Ion Selective Transport on GaN"

22. Enrico D. Lemma[1], Marc Hippler[1,2], Sarah Bertels[1], Kai Weißenbruch[1], Stephan Keppler[1], Martin Bastmeyer[1] ([1]Zoological Institute, Karlsruhe Institute of Technology, Karlsruhe, Germany. [2]APH, Karlsruhe Institute of Technology, Karlsruhe, Germany)

    "Three-Dimensional Direct Laser Writing for Single-Cell Force Measurements"

23. Ryohei Ikura[1], Shunsuke Murayama[2], Junsu Park[1], Motofumi Osaki[1], Yoshinori Takashima[1,3], Hiroyasu Yamaguchi[1], Akira Harada[4], Yuka Ikemoto[5], Go Matsuba[2] ([1]Department of Macromolecular Science, Graduate School of Science, Osaka University, Japan. [2]Graduate School of Organic Material Engineering, Yamagata University, Japan. [3]Institute for Advanced Co-Creation Studies, Osaka University, Japan. [4]The Institute of Scientific and Industrial Research, Osaka University, Japan. [5]Japan Synchrotron Radiation Research Institute, Japan)

    "Preparation of Polymeric Materials with Movable Cross-Linking and Their Mechanical Properties"

24. Marc Hippler[1], Kai Weißenbruch[1], Kai Richler[1], Masaki Nakahata[2], Enrico D. Lemma[1], Benjamin Richter[3], Eva Blasco[1], Akira Harada[4], Yoshinori Takashima[5,6], Motomu Tanaka[7,8], Martin Wegener[1], Martin Bastmeyer[1] ([1]Institute of Applied Physics, Karlsruhe Institute of Technology, Germany. [2]Graduate School of Engineering Science, Osaka University, Japan. [3]Nanoscribe GmbH, Germany. [4]Institute of Scientific and Industrial Research, Osaka University, Japan. [5]Institute for Advanced Co-Creation Studies, Osaka University, Japan. [6]Graduate School of Science, Osaka University, Japan. [7]Physical Chemistry of Biosystems, Heidelberg University, Germany. [8]Center for Integrative Medicine and Physics, Institute for Advanced Study, Kyoto University, Japan)

    "Stimuli-Responsive 3D Micro-Scaffolds for Single Cell Actuation"

25. Philipp Linke[1], Masaki Nakahata[2], Yoshinori Takashima[3], Sasha Dietrich[4], Carsten Müller-

Tidow[4], Anthony D. Ho[4], Akira Harada[3], Masaki Sano[5,6], Motomu Tanaka[1,7] ([1]Physical Chemistry of Biosystems, Institute of Physical Chemistry, Heidelberg University, Germany. [2]Department of Materials Engineering Science, Graduate School of Engineering Science, Osaka University, Japan. [3]Department of Macromolecular Science, Graduate School of Science, Osaka University, Japan. [4]Department of Internal Medicine V: Hematology, Oncology and Rheumatology, Heidelberg University, Germany. [5] Department of Physics, Graduate School of Science, The University of Tokyo, Japan. [6]Institute of Natural Sciences, Shanghai Jiao Tong University, Shanghai, China. [7]Center for Integrative Medicine and Physics, Institute for Advanced Study, Kyoto University, Japan)

"Development of New Dynamic Substrates for the Mechanical Regulation of Mesenchymal Stem Cells"

26. Nodoka Mitake[1], Masaki Nakahata[2], Yoshinori Takashima[1,3], Akira Harada[1], Hiroyasu Yamaguchi[1], Motomu Tanaka[4,5] ([1]Graduate School of Science, Osaka University, Japan. [2]Graduate School of Engineering Science, Osaka University, Japan. [3]Institute of Advanced Co-Creation Studies, Osaka University, Japan. [4]Physical Chemistry of Biosystems, Institute of Physical Chemistry, Heidelberg University, Germany. [5]Center for Integrative Medicine and Physics, Institute for Advanced Study, Kyoto University, Japan)

    "Development of Cell Scaffold Materials Formed from Gelatin and Synthetic Polymer Cross-Linked by Host-Guest Interaction"

27. Judith Thoma[1], Tetsuya Hiraiwa[2,3], Masaki Sano[2], Motomu Tanaka[1,4] ([1]Physical Chemistry of Biosystems, Heidelberg University, Germany. [2]Department of Physics, The University of Tokyo, Tokyo, Japan. [3]Mechanobiology Institute, National University of Singapore, Singapore. [4]Center for Integrative Medicine and Physics, Institute for Advanced Study, Kyoto University, Kyoto, Japan)

    "Dynamic Phenotyping and Theoretical Modeling of Crawling Cells"