



Symposium SM5: Aqueous Cytomimetic Materials

A wide variety of living materials consist mainly of aqueous solutions containing different solutes and macromolecules. The assembly of building blocks in aqueous environments results in small units, such as membraneless organelles, as well as large biological tissues and organs. Nature has demonstrated the power to synthesize, fabricate and construct complicated functional materials in mild aqueous and isothermal conditions, in a way that materials scientists and engineers have yet to achieve. For instance, membraneless organelles can be formed in aqueous solutions. Complicated membranes can be assembled from lipids and proteins, achieving excellent control over the transport of molecules into and out of biological cells. A more comprehensive understanding of the science and mechanisms behind these processes will inspire cytomimetic approaches to synthesize new materials, creating opportunities to engineer more complex hierarchical structures.

The exploration into aqueous cytomimetic strategies may start with investigations into the physical processes, such as aqueous phase separation, that are essential for forming relatively simple organelles in biological systems. Aqueous two-phase systems (ATPS) have already demonstrated promises in enabling fabrication of new bio-materials and development of useful biotechnological techniques. The unique properties of the systems resulting from aqueous phase separation often demand new characterization tools. New cytomimetic chemical synthesis can be facilitated with good knowledge of the fluid dynamics and interfacial phenomena underlying the aqueous environments. Modern micro-engineering and microfluidic devices are also playing an increasingly important role in unraveling the mysteries behind aqueous cytomimetic systems and in controlling the assembly of building blocks, such as lipids and proteins in aqueous environments. This symposium will bring together researchers from different relevant disciplines and cover the complete range of topics including fundamentals, characterization, and applications.

Interdisciplinary and multidisciplinary topics related to chemistry, physics, biomedical engineering, materials science and engineering will be organized into different sessions of invited abstracts. Therefore, participants can interact with experts from different areas to explore new avenues relevant to aqueous cytomimetic materials. In the closing session, the abstracts will focus on discussions as to how different disciplines can be integrated together for furthering the applications of aqueous cytomimetic materials.

Topics will include:

- Theory and modeling of phase separation in biological systems
- Fundamentals underlying properties of aqueous phase separation and aqueous two-phase systems
- Bio-materials enabled by aqueous two-phase systems
- Cytomimetic chemistry for materials synthesis
- Applications of aqueous two-phase systems and aqueous emulsions (e.g. biotechnology)

Invited speakers include:

Clifford Brangwynne	Princeton University, USA	Maria Olvera de la Cruz	Northwestern University, USA
Rivas Caballero	Consejo Superior de Investigaciones Científicas (CSIC), Spain	Sarah Perry	University of Massachusetts, USA
Chun-Long Chen	Pacific Northwest National Laboratory, USA	Joseph Schlenoff	Florida State University, USA
Patrick Collier	Oak Ridge National Laboratory, USA	Kathleen Stebe	University of Pennsylvania, USA
Rumiana Dimova	Max Planck Institute of Colloids and Interfaces, Germany	Hossein Tavara	University of Akron, USA
John Frampton	Dalhousie University, Canada	Scott Tsai	Ryerson University, Canada
Gregory Jedd	Temasek Lifesciences Laboratory, Singapore	Kanta Tsumoto	Mie University, Japan
Daniel Kamei	University of California, Los Angeles, USA	Takuya Ueda	University of Tokyo, Japan
Tuomas Knowles	Cambridge University, United Kingdom	Hiroshi Umakoshi	Osaka University, Japan
Istvan Lagzi	Budapest University of Technology and Economics, Hungary	Boris Zaslavsky	Cleveland Diagnostics, USA
Yuichiro Nagatsu	Tokyo University of Agriculture and Technology, Japan		

Symposium Organizers

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