Amphiphilic Molecules and Self-Assembly: Principles and Applications

Overview

Self-assembly is a ubiquitous phenomenon in science, being observed in solution for surfactants, copolymers, or proteins – and, of course, in combinations thereof with other colloidal systems. Accordingly self-assembly is at the heart of many important scientific processes, such as detergency, formulations in pharmacy or cosmetics, biomembranes, biological systems, etc. Accordingly, it is very important to understand the principles of self-assembly and especially how they are related to the molecular composition of the systems and how this translates into the properties of such systems. As an example, rather similar surfactant molecules can become organized in the form of small spherical micelles or worm-like micelles, where the latter may exhibit several orders of magnitude higher viscosity and viscoelastic properties. Another example concerns the solubilisation of hydrophobic molecules in aqueous solutions, which is important for instance for cleaning or tertiary oil recovery, but also for rendering otherwise insoluble drug molecules soluble. Thereby this is a major aspect in drug delivery, as often it is rather easy to have a suitable drug molecule but the main obstacle is making it soluble and deliver it to the desired place. Here, often tailor-made amphiphilic copolymers are employed, which show some general similarities to surfactants but also, due to their more variable molecular architecture, offer unique options for formulating more complex and functional colloidal systems.

Objectives:

The primary objectives of the course are as follows:

i) Introducing participants to the various types of amphiphiles and their fundamental properties.

ii) Giving insights into the principles of self-assembly and how to control structure and properties of such aggregates.

iii) Learning how to employ amphiphiles and the assemblies for practical applications. Gaining insight into how to formulate amphiphilic systems according to structure-property relations.

iv) Extending the knowledge of principles of surfactant science to the rapidly developing field of amphiphilic copolymers, with an emphasis on similarities and particular properties of copolymers.

Modules

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<th>Modules</th>
<th>Module A: Basic properties of amphiphilic molecules.</th>
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<td>Module B: Applications of amphiphilic systems.</td>
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<td>March 07- March 12, 2016</td>
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<td>Number of participants for the course will be limited to fifty.</td>
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You Should Attend If...

- Executives, engineers and researchers from manufacturing, service and government organizations including R&D laboratories.
- Students at all levels (BTech/MSc/MTech/PhD) or Faculty from reputed academic institutions and technical institutions.
- You are a student or faculty from academic institution interested in learning how to do research on Amphiphilic Molecules and Self-Assembly.

Fees

The participation fees for taking the course is as follows:

- Participants from abroad: US $300
- Industry/ Research Organizations: 5000
- Academic Institutions: 2500

The above fee includes all instructional materials and assignments, laboratory equipment usage charges, 24 hr free internet facility. The participants will be provided with accommodation on payment basis.
The Faculty

**Prof. Michael Gradzielski** is one of the 18 Full (Structural) Professors of the Institute for Chemistry of the Technische Universität Berlin, Germany. He has published about 200 articles in internationally renowned journals. He is currently vice-president of the German Colloid Society and dean of the faculty for Mathematics and Natural Sciences. Previously he has been serving on the boards of the German division of detergency science and in the scientific council of the Institut Laue-Langevin (ILL), Grenoble, France. For his research, he has received in 1997 the award for "basic research related to surfactants" by the German Chemical Society "Förderpreis der Fachgruppe Waschmittelchemie der Gesellschaft Deutscher Chemiker (GDCCh)" and in 2009 the Liesegang-prize of the German Colloid Society.

**Prof. S. K. Mehta**, Director SAIF/CIL/UCIM and Professor and former Chairman, Department of Chemistry, Panjab University, Chandigarh has made significant contributions in the field of Surfactant Chemistry and Nano-chemistry that includes: Fabrication and applications of nano particles, Solubilization enhancement and Drug carriers, Synthesis of novel metallosurfactants and complexes, Protein-surfactant interactions and Physico-chemical aspects of liquid mixture. Dr. Mehta is credited with more than 215 publications in international journals of repute with h-index of 26 and is an author of about 10 books/chapters. He has been nominated as member of several DST, CSIR and UGC committees. He has been conferred with renowned DAAD and JSPS fellowships several times, Bronze medal from Chemical Research Society of India (CRSI), authors award by Royal Society of Chemistry, UK, Haryana Vigyan Ratna award and Prof. W.U. Malik Memorial Award of Indian Council of Chemists (ICC) for the year 2015 for his outstanding contribution in research. He has been a visiting scientist to several countries including Germany, Japan, USA and France.

Course Co-ordinator

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