



Panjab University
Chandigarh

Global Initiative of Academic Network

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GLOBAL INITIATIVE OF ACADEMIC NETWORKS



MINISTRY OF
HUMAN RESOURCE DEVELOPMENT, GOVT. OF INDIA



National Coordinating Institute
INDIAN INSTITUTE OF TECHNOLOGY KHARAGPUR

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INTERNATIONAL WORKSHOP

on

**“Amphiphilic Molecules and Self-Assembly :
Principles and Applications”**

‘An event under’



सत्यमेव जयते

GiAN

Global Initiative of Academic Networks



March 22-28, 2016

Venue:

**Seminar Hall, Department of SAIF/CIL,
Panjab University, Chandigarh**

Organized by:

Panjab University, Chandigarh

under the aegis





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Guest 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 and in 2009 the Liesegang-prize of the German Colloid Society.



Course Coordinator

Prof. S. K. Mehta, Director SAIF/CIL/UCIM and Professor and former Chairman, Department of Chemistry Panjab University, Chandigarh has made significant contribution in the field of Surfactant Chemistry and Nanochemistry. He has been conferred with renowned DAAD and JSPS fellowships and also awarded with 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).

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Overview of Workshop

Total number of participants: 51

Sr. No.	Name of the Institute	Number of participants
1	Panjab University	24
2	Kurukshetra University	9
3	Thapar University, Patiala	5
4	GNDU, Amritsar	5
5	NIT Jalandhar	3
6	JNU, New Delhi	1
7	MCM DAV College, Chandigarh	1
8	GTB Khalsa College, Dasuya	1
9	J.C. DAV College, Dasuya	1
10	Post Graduate Government College, Chandigarh	1

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Day-1: Inauguration **Global Initiative of Academic Network**

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Prof. R. N. K. BAMEZAI, F.N.A.Sc; F.I.M.S.A; F.A.M.S; F.N.A.
Professor of Genetics and Director, National Centre of Applied Human Genetics, JNU, New Delhi .
Former Vice Chancellor, SMVDU, Katra, Jammu.



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Day-1 to 7: Overview of Workshop Global Initiative of Academic Network

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A video broadcast of the event was transmitted across the Internet.

Panjab University webcast.pu.ac.in

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Today's Webcast

International Workshop on Amphiphilic Molecules and Self-Assembly: Principles and Applications

15.4 Schizophrenic Micelles

Poly(Acrylic Acid)-block-Poly(N,N-Diethylacrylamide)

POEAAm PAA

pH 2.8 $T > T_c$ pH 5.4 $T < T_c$

precipitation

ENG 1:01 PM
INTL 3/28/2016



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Amphiphilic Molecules and Self-Assembly: Principles and Applications



**Prof. Michael Gradzielski, Stranski-Laboratorium für
Physikalische und Theoretische Chemie; Institut für Chemie
Technische Universität Berlin**

- ✓ Very broad and interdisciplinary field.
- ✓ Elementary background and more complex applications.
- ✓ Important for
 - Washing/detergency, cosmetics, pharmacy, food, etc.
 - Nanotechnology: Nanostructured materials
 - Biology, biochemistry: membranes, proteins, biomineralization, ...



**nanostructured
systems**

structures in the nm-range

**mesoscopic
systems**

mesoscopic: 1 nm - 1 μ m

**supramolecular
chemistry**

complexly built molecular
aggregates; host-guest
complexes

Self-Assembly

Structuring on a supramolecular length scale via physical bonds
(chemical bonds possible – templating)

biomolecules:
proteins, DNA, lipids

low Mw amphiphiles
(surfactants)

polymers, polysoaps

inorganic colloids



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Day-3 Holi Celebration **Global Initiative of Academic Network**

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**Staff
Club**





- ❖ Lecture 1: Classes of amphiphiles, Chemical build-up, and main uses in application
- ❖ Lecture 2: Types of amphiphilic copolymers, preparation and properties
- ❖ Lecture 3: Typical types of aggregates, sizes and structures, Explanation of the aggregate shape by the packing parameter concept.
- ❖ Tutorial 1: Discussion of the application of different types of surfactants for different practical applications, Application of the concept of packing parameters
- ❖ Lecture 4: Experimental characterisation of micellar structures, electron microscopy, light scattering (SLS, DLS), small angle x-ray and neutron scattering (SAXS, SANS)
- ❖ Lecture 5: Surface activity of amphiphiles, Gibbs adsorption isotherm, Szyskowski equation, other adsorption isotherms
- ❖ Lecture 6: Wetting properties, spreading and super-spreading, super-hydrophobicity
- ❖ Tutorial 2: Practical relevance of surface tension
- ❖ Lecture 7: Thermodynamics of self-assembly, phase separation model, closed association model, isodesmic model, rod-like micelles
- ❖ Lecture 8: Experimental methods to determine the thermodynamics of micellization, isothermal titration calorimetry (ITC)
- ❖ Lecture 9: Micellar kinetics, kinetic equilibrium, Aniansson-Wall model, kinetic constants, measurement of kinetic parameters
- ❖ Tutorial 3: Relaxation methods for investigating micellar kinetics.



- ❖ Lecture 10: Solubilisation of oils, interfacial tension, emulsions
- ❖ Lecture 11: Microemulsions – structure and conditions for formation
- ❖ Tutorial 4: Understanding further the relation between oils and surfactants
- ❖ Lecture 12: Surfactants in drug delivery
- ❖ Lecture 13: Detergency
- ❖ Lecture 14: Surfactant directed synthesis of advanced materials
- ❖ Tutorial 5: Interactions between surfactants and other molecules – structural implications
- ❖ Lecture 15: Self-assembly of responsive copolymer systems
- ❖ Tutorial 6: Some basics on copolymers and polyelectrolytes
- ❖ Lecture 16: Formation of complexes of surfactants and polyelectrolytes – towards more advanced aqueous systems



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Day-1 to 7: Overview of Workshop **Global Initiative of Academic Network**

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Day-7: Valedictory Function
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Thank You

Lessons we learned
Experience we gained