IV International Conference on Colloid Chemistry and Physicochemical Mechanics

Moscow, Russian Federation
June 30 – July 5, 2013

From June 30 to July 5, 2013, M.V. Lomonosov Moscow State University had honour to conduct the IV International Conference on Colloid Chemistry and Physicochemical Mechanics. The principle organizers were chairmen of colloid departments at Moscow University (Professor V.G. Kulichikhin) and St.-Petersburg University (Professor A.I. Rusanov). The technical support of the Conference was conducted by a service-agent "Monomax". This conference traditionally takes place every fifth year in Russia since 1998. Now it became one of the important meetings dedicated to discussing the news in colloid and surface phenomena science. The Conference language is customarily English.

The current conference was dedicated to the centenary of the discovery of micelles (J.W. McBain et al. Colloids and their viscosity: Discussion, Faraday Soc.: Trans. 9 (1913) 99-107). The dedication gave an emphasis to lyophilic systems in the program, and, particularly, in four plenary lectures. Professor Anatoly I. Rusanov (Russia) in his lecture "Amazing world of micelles" highlighted some paradoxes in the thermodynamic and kinetic features of micelles. He considers micelles as equilibrium structures obeyed to the Gibbs-Curie principle in opposite to embryos of a new phase. Dualism in micelles properties consists in their polymorphism accompanied with solid-like character of their structure and liquid-like behavior. One more amazing property of micelles is that the chemical potential of molecules in a micelle changes in the same direction as the aggregation number. Then the lecturer emphasized the special features on the behavior of ionic micellar solution.

Professor Björn Lindman (Sweden) in cooperation with T. Nylander, F. Antunes, C. Morán, D. Costa, M. Miguel, and L. Piculell has delivered the lecture "Polyelectrolyte-surfactant association - from fundamentals to applications". He demonstrated numerous examples of practical application based on our knowledge of the surfactant structure and properties. The difference in binding to polymers between ionic and nonionic surfactants leads to varieties in their applications. In particular, there is a strong difference in adsorption of polymer-surfactant mixtures on polar and non-polar surfaces. A special attention should be drawn to recent results concerning interaction between cationic surfactant and DNA that is important for understanding the behavior of DNA in biological systems and gene therapy.

Professor Peter A. Kralchevsky (Bulgaria) with co-authors K.D. Danov and S.E. Anachkov presented the lecture "Quantitative approaches to micellar equilibria, growth and dynamics" considered step-wise thinning of liquid films formed from micellar solutions. The kinetics of this process depends on the micelle aggregation number and charge. A quantitative model describing this process and taking into account various factors (concentrations of all monomer species, electrolyte conductivity, salt concentrations and so on) was proposed. A model predicts the existence of different kinetic regimes and experiment confirms this conclusion.

Professor Aziz M. Muzafarov (Russia) with coathors A.V. Bystrova and I.B. Meshkov talked in his lecture "Macromolecular nanoobjects and lyophilic colloids: new intersections of colloid and polymer chemistry" about new intermediate polymeric/colloid objects called as "macromolecules-particles", such as dendrimers, hyperbranched polymers, and polymeric nanogels. This is a new boundary area between macromolecular and colloid chemistry based on the successes in the synthesis of so-called molecular silicasoles with different density of the silica core. The lecturer developed a phenomenological model of transition from macromolecule-particles to lyophilic colloid disperse phase.

The plenary lectures as well as some section presentations rather clearly demonstrated the trend of convergence of macromolecular chemistry and concepts of colloid chemistry as well as the growing interest to biopolymers as an important objects of colloid science including their practical applications. The Conference program was split between ten thematic sections, namely:

- Lyophilic colloid systems
- Nanomaterials
- Surface phenomena and adsorption
- Surfactants, emulsions, and foams
- Interface rheology, microfluidics, and superhydrophobic surfaces
- Stability of colloid systems, stabilization factors
- Colloid chemistry of polymers
- Natural disperse systems, biotechnology, and colloid chemistry of alimentary products
- Theoretical issues of colloid chemistry and physicochemical mechanics
- Mechanochemistry, physicochemical mechanics, and rheology of complex liquids

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As a satellite event of the conference, the 2nd Russian National Symposium on Surfactants was held simultaneously. According to the final conference program, there were 121 oral and 265 poster presentations. The presentinging authors came from Russia and other CIS countries, Europe (Poland, Germany, UK, Spain, etc.), North and South America (USA, Canada, Brazil), Africa and Middle East (Algeria, Israel), India, and Far East (China, Taiwan, South Korea).

Scientific results discussed at the Conference can be found in the published printed Conference materials which include the complete program of the Conference (72 pages) and book of Abstracts (560 pages) which contains extended abstracts (up to two pages) of all accepted presentations. The conference program comprised not only scientific presentations. The exposition of scientific equipment was prepared by several manufactures including Tirit Ltd. (Russia), Malvern Instruments Ltd. (represented by KD Systems and Instruments Ltd.), and Teclis (France).

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