32nd Conference of

The European Colloid and Interface Society

Ljubljana, Slovenia, 2nd - 7th September 2018

Book of Abstracts

Book of Abstracts of The 32nd Conference of the European Colloid and Interface Society - ECIS2018

Publisher:
University of Ljubljana
Faculty of Chemistry and Chemical Technology
Večna pot 113
1000 Ljubljana
Slovenia

Editors:
Marija Bešter-Rogač
Ana Kroflič
Iztok Prislan
Martin Šala
Bojan Šarac

Design:
Repster, Robert Rep s.p.

Ljubljana, August 2018
Copies: 650
Publication is not for sale.
The 32nd ECIS Conference Organizing Committee

CIP - Kataložni zapis o publikaciji
Narodna in univerzitetna knjižnica, Ljubljana

544.77(082)(0.034.2)

EUROPEAN Colloid and Interface Society. Conference (32 ; 2018 ; Ljubljana)
Book of abstracts [Elektronski vir] / 32nd Conference of The European Colloid and Interface Society, Ljubljana, Slovenia, 2nd-7th September 2018 ; [editors Marija Bešter-Rogač ... et al.]. - Ljubljana : Faculty of Chemistry and Chemical Technology, 2018

ISBN 978-961-6756-90-7
1. Bešter-Rogač, Marija
296262912

Nanoreactors from electrostatically bridged like-charged surfactants and polyelectroytes

M.J. Thiele[1], M.D. Davari[1], U. Schwaneberg[1] and L.A. Tsarkova[2]

[1]Institute of Biotechnology, RWTH Aachen University, Worringerweg 3, 52056 Aachen, Germany
[2]Department of Chemistry, Chair of Colloid Chemistry, Moscow State University, 119991 Moscow 1, GSP-1, 1-3 Leninskiye Gory, Russia

Presenting author email: tsarkova@colloid.chem.msu.ru

Association colloids such as micelles, vesicles or aggregates of surfactants with synthetic- or bio-polymers play an important role in modern technologies including pharmaceutics and cosmetic, food, laundry and home care.

We report a complex multicomponent system, containing ethoxylated anionic surfactants, anionic polyelectrolytes and enzymes, which posses a high efficiency to solubilize poorly water-soluble immobilized proteins (Figure 1A). By considering separate combinations of the system components at varied concentration regimes we addressed competitive interfacial and intermolecular interactions on different time- and length-scales. Using a set of methods such as dynamic tensiometry, solubilisation assay, molecular dynamic simulations we disclosed unexpected attractive interactions of fully neutralized polyacrylic acid (PAA) with like-charged surfactants in the presence of multivalent cations. A key contribution to the understanding and characterization of the macroscopic effect of enhanced solubilisation performance was gained by the analysis of dynamic processes at interfaces and of competitive binding interactions with Ca^{2+} ions in the multicomponent system (Figure 1B-C). In a narrow compositional range, the proposed bridging interactions via complexation with Ca^{2+} provide self-assembly of multicompartment dynamic soft nano-reactors with the solubilisation capacity exceeding that of conventional micelles [1].

Incorporation of a protease into such dynamic nanoreactors results in a synergistically enhanced cleaning performance. Apart from direct impact of these findings on the sustainability of laundry technology, revealing novel electrostatic association mechanisms and understanding interactions of hydrophobic species with biocompatible assemblies, like reported here compartmentalized surfactant/polymer/enzyme carriers, may give rise to new design approaches of delivery systems with possible biomedical applications.

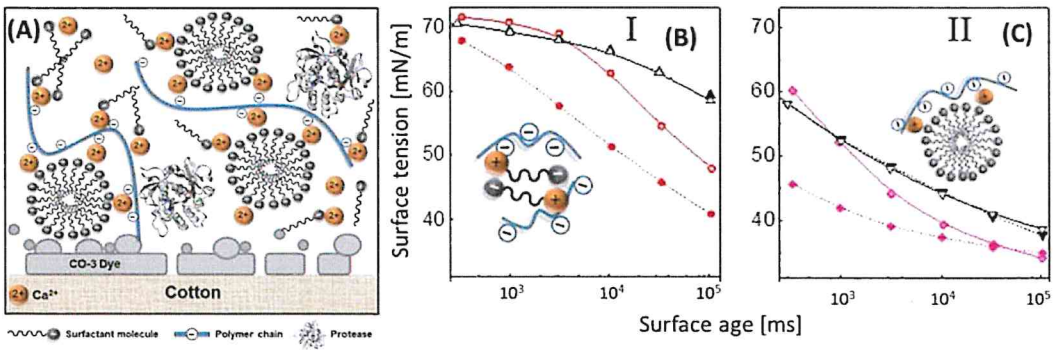

Figure 1. (A) Schematic of a multicomponent system highlighting individual and associated species formed between protease, SLES surfactant, polymer PAA and immobilized hydrophobic protein. (B,C) Kinetic curves of the surface tension of SLES solutions I (below CMC) and II (above CMC) in soft water (black triangles) and in the presence of Ca^{2+} ions (empty circles and diamonds) and PAA/ Ca^{2+} (filled symbols).

[1] M. J. Thiele, M.D. Davari, I. Hofmann, et al. *submitted.*