

COST D43: Colloid and Interface Chemistry for Nanotechnology

Program Workgroup 3: Responsive soft-materials through self-assembly

Target of the WG activities

The major route towards nanostructured materials is self-assembly, which means that nanoscale objects assemble spontaneously out of their molecular precursors. Micelles are well-known examples of such objects. When surfactants are dissolved in an appropriate solvent and concentration, the surfactant molecules assemble into nanoscale aggregates of surfactant molecules, referred to as micelles. Such micelles can be used as nanoreactors offering an apolar environment for particle synthesis, chemical reactions, or sensor applications. Colloid chemists have by now discovered a plethora of other self-assembling objects, and many more are still to come. Examples include microemulsions, which can be used as templates for nanocomposites or in alternative formulation strategies (e.g., oil recovery, gasoline), macro-emulsions or mini-emulsions, whereby the latter two represent the basis for the formulation of apolar compounds (i.e., foods, cosmetics, drugs). More recent discoveries include polyelectrolyte capsules, polyelectrolyte complexes, or block-copolymer micelles. Promising applications of the latter are formulation and encapsulation of chemical products (e.g., pharmacy, cosmetics, food) or influencing chemical reactivity through restricted geometries (e.g., gene vectors, biotechnology). For these reasons, the development of strategies towards such soft self-assembling materials with unique reactive and functional properties will represent a major thrust of this workgroup. Potential applications in food, cosmetic, pharmaceutical or biomedical industries will be particularly highlighted.

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