Self-Organization of Building Blocks into Functional Materials

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Abstract
There have been rapid advances in the synthesis of macromolecules, nanoparticles and colloids. But while biology self-organizes such building blocks into structures and materials with great ease, reproducing similar complex self-organization processes in the lab requires further developments. The focus of our research lies at the interface of experimental realizations of self-organizing systems and their theoretical understanding. For this purpose, we develop new models and apply advanced computer simulations. In this talk, I will discuss recent advances achieved in diverse systems such as colloids [1], nanoparticles [2], and granular robots [3]. I will demonstrate that only the close interplay of simulation and experiment allows a thorough understanding of these systems, which is crucial for the optimization of their function and their practical applications.

Literature

Brief Bio
Michael Engel received his doctorate in physics from the University of Stuttgart in 2008. He then worked at the University of Michigan in Ann Arbor, USA as a research scientist on problems involving self-assembling shapes, packing, and aperiodic order. Since 2016 he has been Junior Professor in the Institute for Multiscale Simulation, Department of Chemical and Biological Engineering at Friedrich-Alexander-University Erlangen-Nuremberg. His research lies at the intersection of chemical physics, engineering, and materials science. His favorite scientific tools are statistical mechanics, high-performance computing, and crystallography.

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