



Polymers under Multiple Constraints

Polymer- & Soft-Matter-Seminar

Tuesday,
19th January
2016

at: 5.15pm

VDP4 1.27,
Von-
Danckelmann-
Platz 4,
06120 Halle

Prof. Dr. Alexander Wittemann

(University of Konstanz)

“From nanoparticles towards “colloidal molecules” and partially beyond.”

The rational design of complex functional colloids from nanoscale building blocks is of significance to practical applications including sensing, photonic, and electronic devices, but it is also becoming a source of inspiration of materials scientists and engineers to create the next-generation of hierarchically organized materials.

In this context, joining together different spherical nanoparticles in a defined manner allows control over shape, composition and surface roughness of the nanocomposites. If the constituents consist of different materials, the resulting heteroaggregates feature both compositional and interfacial anisotropy offering unprecedented perspectives for rationally designed functional colloids.

If the dimensions of such nanoparticle clusters are kept in the colloidal domain, the colloidal assemblies underlie Brownian motion. Hence, such clusters are ideal model systems to study the motion of objects with complex shapes. Their translational and rotational diffusion coefficients can be determined by depolarized dynamic light scattering. Knowing the exact geometry of the assemblies, the experimental results can be compared to model predictions.

Clusters of plasmonic nanoparticles show an outstanding optical performance exhibiting SERS enhancement factors that are over three orders of magnitude higher than those of their constituent nanoparticles. Such plasmonic colloids open new perspectives for the investigation of optical interactions between nanoparticles, but they also have perspectives for sensing and nonlinear nanophotonics.