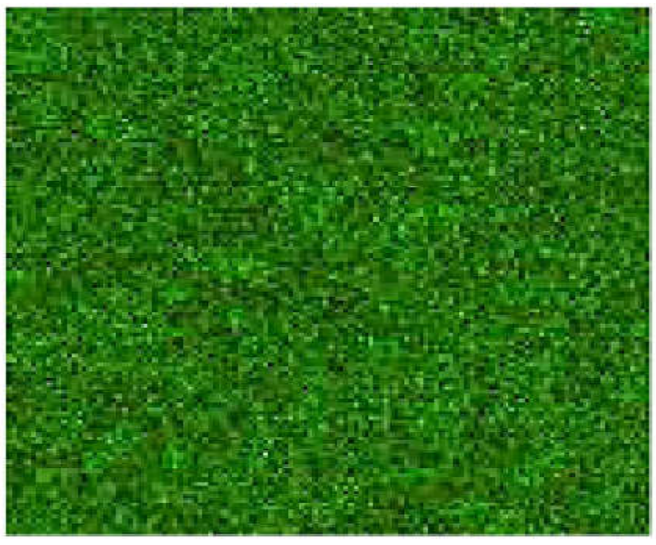
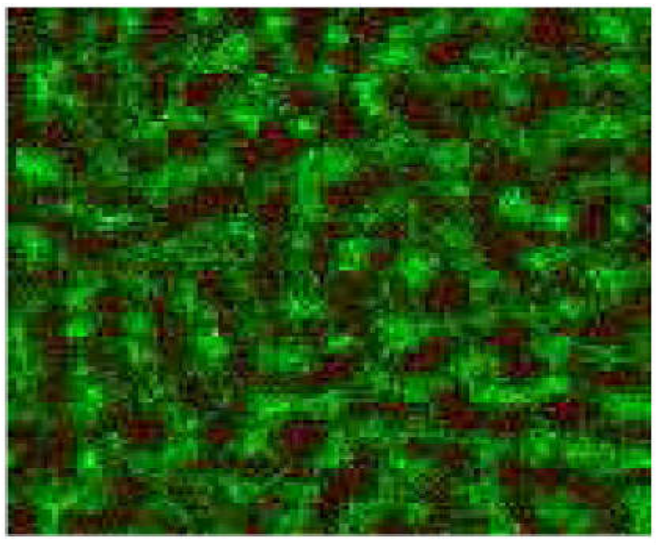
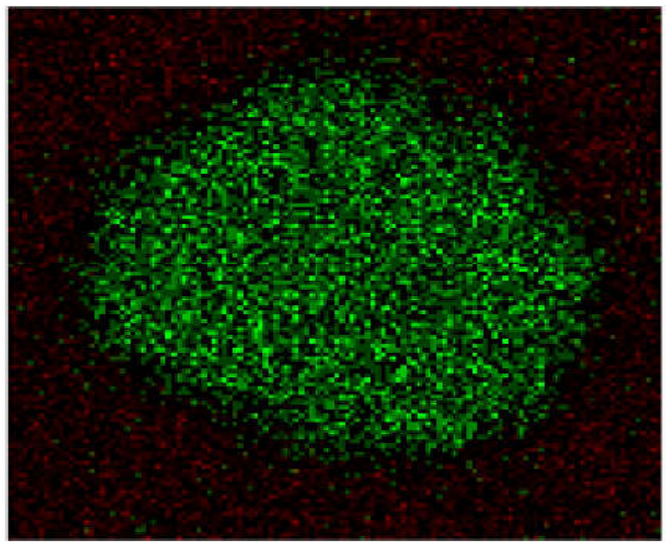
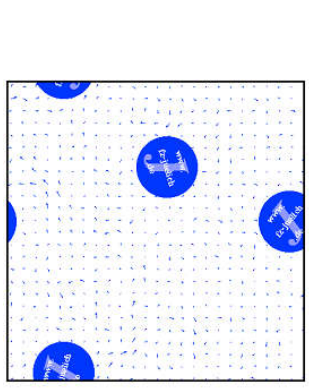
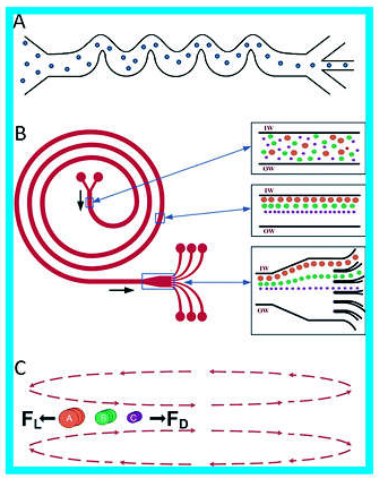
83st MSS-Seminar
Wednesday, January 13th, 15:30
Nägelsbachstr. 49b

Particle-Based Mesoscopic Simulation for Complex Fluids in Microfluids

Kuang-Wu Lee
Max-Planck-Institute for dynamics and Self-Organization, Göttingen, Germany

With the latest advances in microfluidic manipulations, novel usages of the micro-flow control have opened up windows for advanced designs of new materials, as well as the highly portable bio-chemical devices. Many of their experimental setups the complex fluids, instead of simple isotropic fluid, are utilized to extend their peculiar physical characters in microscopic geometry. The appealing capabilities of using complex fluids include multi-phase flow manipulation, micro-droplet productions and precise micro-cargo transportation. Despite their great success in those innovative laboratorial exercises, the analytical studies for this multi-scale complex system fall still behind. This is particularly because the system characteristic energies comes close to its thermal energy, the hydrodynamic theory/numerics fail to describe the thermal fluctuation related phenomenon.

In this talk a mesoscopic particle-based model (SRD) for complex fluids is proposed. This is an appropriate numerical model that can handle the addressed topics in the mesoscopic scale, with the flexibility of tuning compressibility and finite-size particle effect. The extensibility of this model in real laboratory geometries, as well as future possible applications in various particle-based systems, will be discussed.