

Physikalisches Kolloquium

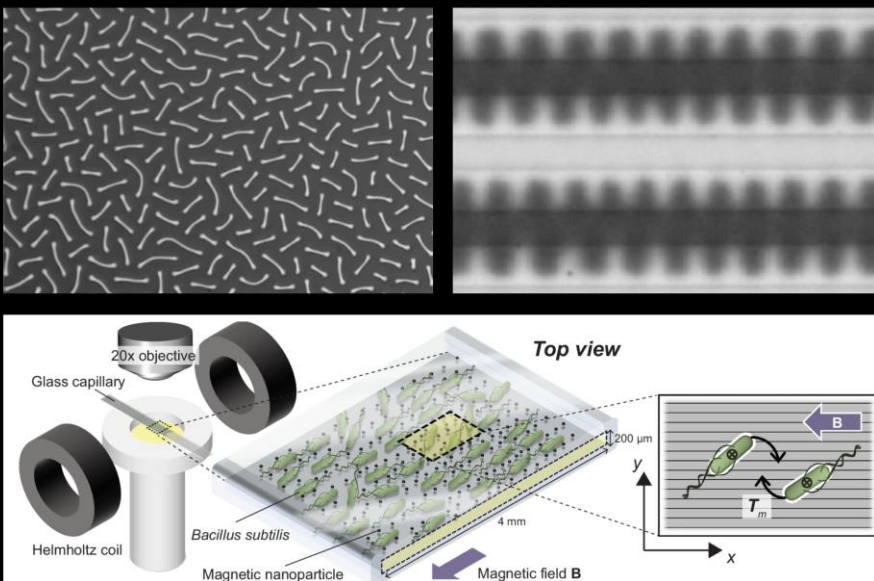


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Connecting Ferrofluids and Living Matter

Ferrofluids are strongly magnetic fluids consisting of solid magnetic nanoparticles dispersed and stabilised in a carrier liquid. They exhibit numerous beautiful instabilities and have fascinated the scientific community and enabled technological applications since 1960s. In this talk I will present three recent advances in science and applications of ferrofluids. Firstly, I will demonstrate ferrofluidic aqueous two-phase systems with two immiscible aqueous phases and ultraslow interfacial tension, allowing miniaturisation of the classic ferrofluid patterns. Secondly, I will demonstrate electrically controllable ferrofluids based on combining ferrofluids with charge carrying reverse micelles and discuss the magnetic and electric instabilities and their combinations these so called “electroferrofluids” exhibit. Finally, I will demonstrate the ability to control living organisms and their collective states using magnetic forces and torques mediated by ferrofluids, focusing especially on *Bacillus subtilis* bacteria and the active turbulence they exhibit.

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**Prof. Dr.
Jaakko Timonen**
Aalto University, Espoo
Finland