

# Lab Chips and Organization of Surfaces Powered by Molecular Motors

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Motor proteins have major roles in body function. This includes organization of the cell interior, organization of tissues and motility of the entire organism, the latter being executed by the molecular motors of muscle.

We aim to exploit the biological molecular motors by integrating them with artificial environments for applications in diagnostics, drug discovery and cell biology. I will describe these developments including: 1. spatial control of motor driven transportation by nanopatterned surfaces, 2. motor based cargo transportation on a chip (with cargoes such as liposomes and quantum dots) and 3. detailed characterization of surface-motor interactions. The latter studies aim at optimization of the lab-on-a-chip devices, but will also contribute to the general understanding of surface-protein interactions of ubiquitous importance in different biosensor systems.

Finally, I will describe the persistent random motion of cytoskeletal filaments observed when these are propelled by molecular motors adsorbed on an artificial surface. Interestingly, this process can be described by a diffusion coefficient, related to the myosin motor properties and the filament mechanics by an analogy of the Einstein equation ( $D = kT/\gamma$ ). The process opens for motor powered organization of surfaces, e.g. to create gradients of various biological macromolecules.