Modular micro-swimmer is made of an electrolyte releasing reservoir particle (RP) settled to a charged surface. It may be realized in various ways, e.g. if RP is placed in a dispersion of colloidal spheres (non-active particles or NAPs) a moving complex consisting of the reservoir particles followed by the colloids is formed [1]. The motion mechanism is based on the formation of the electrolyte gradient around the RP. Within this gradient a local electric field is formed, which gives the rise to the electro-osmotic solvent flow along the charged substrate and electro-phoretic motion of NAPs.

To quantify the swimming behaviour of the complex we started with the characterization of the electrolyte gradient. The especially developed microphotography technique was applied to measure the gradients with high temporal and spatial resolution. The electro-kinetic response of the substrate and NAPs to the field was studied with the integral Doppler velocimetry set up. It allows simultaneous detection and quantification of electro-osmotic and electro-phoretic phenomena [2, 3]. We’ve implemented a novel experimental cell with exchangeable walls to study influence of different substrate types on the solvent flow. The length scale of the inner-complex interactions between RP and NAPs was studied with PIV. The range dependent velocity of the non-active particles reflects changes in the forces acting on the non-active particles.

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