

Interactions within *single* pairs of colloids

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Colloids are usually studied in large ensembles by scattering techniques. In contrast, experiments reported here are carried out on *single* colloids or *single pairs* of colloids. For that, Optical Tweezers (OT), which enable one to position - without any mechanical contact - a single colloid in three dimensional space and to measure the forces acting on it, are employed. This can be achieved with extraordinary precision in the determination of the position of the colloid or of the separation between two colloids (± 1 nm) and in the measurements of the forces of interaction (± 50 fN). Additionally, these experiments benefit from the fact that they can be conducted over extended periods of time (several hours) with the *identical* colloid. By changing the surrounding medium, details of the interaction potential can be explored and effects due to the variability between different colloids (in size, in grafting density etc.) are ruled out.

In the talk, recent experiments will be presented on (i) the interaction within *single* pairs of polymer grafted colloids in media of varying ionic strength, (ii) drag-induced forces on colloids in polymer solutions of varying concentration and ionic valence, (iii) the flow resistance of *single* DNA-grafted colloids in different media and (iv) single colloid electrophoresis (SCE). In the latter, the electrophoretic and electro-osmotic mobility in an external AC electric field are measured by probing the *identical* colloid. Finally, of special interest is the possibility to analyse receptor/ligand interactions on a single contact level using appropriately prepared colloids.

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