DYNAMIC STUDY AND CONTROL OF GOLD COLLOIDAL DROP EVAPORATION

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One of the major technological bottelnecks of nanotechnology research is the precise localization of nanostructures to fully exploit their intrinsic properties. For example, one would like to put a Qdt[1] in the high field center of an optical cavity, position a Nc[2] between two electrodes, or use a metallic Np[3] as a catalyzer for localized wire or CNT[4] growth. Several ingenious approaches have already been developed using local capture techniques involving magnetic or electrostatic fields for single nanostructures as well as global strategies like functionalized substrates and large scale templates.

In this work, we present our results on an alternative technique **[1-3]** to localized Np from colloidal solution into lithographic patterns. This technique is based on the use of capillary forces applied on the Np at the triphasic point (vapor-liquid-substrate) when the solvant evaporates above the lithographic pattern. Pattern filling can be obtained when the capillary force is superior to thermal fluctuations (several kT). The strength and direction of this force is determined by careful control of the contact angle at the triphasic point, surface tension and contact line speed . Dynamically monitoring of the drop drying allows to show different regimes in the drop evaporation. By controlling the drop temperature, the contact line speed (CLS) can be modulated. Finally, the exponential behavior of CLS-temperature relationship has been put into evidence.

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[1] Qdt : Quantum dot
[2] Nc : Nanocrystal
[3] Np : Nanoparticle
[4] CNT : Carbon Nanotube