

## Formation of silver nanoparticles in spherical polyelectrolyte brushes and encapsulation in silica

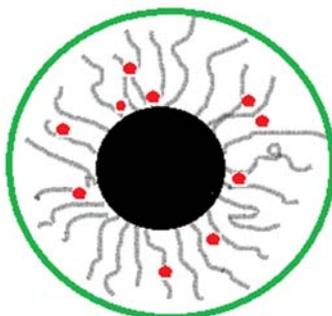
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Nanoparticles are of great interest for both physics and chemistry because of the wide range of applications. A large variety of metals like gold, silver and platinum as well as a large number of methods of preparation are available to tune the desired properties.

In this study we use spherical polyelectrolyte brushes (SPB) as template [1,2]. The SPB used consist of polystyrene cores upon which a large number of linear chains of polyacrylic acid is grafted. Formation of silver nanoparticles in the layer of polyacrylate chains is achieved either by photochemical reduction using UV light or by employing NaBH<sub>4</sub> as a chemical reducing agent. Both methods are being investigated to optimize number, density and size of the nanoparticles.

In order to protect the nanoparticle-loaded SPBs they are encapsulated in silica by applying a modified Stöber process [3]. The systems are characterized by UV/Vis spectroscopy and electron microscopy.



**Figure 1.** Schematic representation of the investigated system. Polystyrene core (black center), polyacrylic acid brushes (grey lines), nanoparticles (red dots) and silica shell (green circle)

[1] Anna Ezhova, *Specific interactions of Ag<sup>+</sup> ions with linear polyacrylate chains and spherical polyacrylate brushes and Ag nanoparticle formation therein*, (Doctoral Thesis, Paderborn, 2015).

[2] X. Guo et al., *Macromolecules* **32** (1999) 6043.

[3] W. Stöber et al., *Journal of Colloid and Interface Science* **26** (1968) 62.

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