NEW SIMPLE METHOD FOR TRAPPING NANOPARTICLES

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In the last years, the interest in the chemical synthesis of metallic nanoparticles is growing due to their optical, electronic, magnetic, and catalytic applications. The shape and size are important parameters, their properties are related to these factors, and many synthetic methods have been developed which control them.

Water is a very common solvent for the preparation since it dissolves a variety of ions and stabilizing molecules. On the other hand, organic solvents are interesting for some applications like catalysis and surface modification, and synthetic methods have been also reported in polar organic solvents. Nevertheless, the shape and size control is not that facile in organic solvents and usually, the particles which are synthesized in aqueous media are not dispersable in organic solvents (and those synthesized in organic solvents are not dispersable in aqueous media). This is the main reason behind the growing research effort to develop methods of phase transfer of nanoparticles between water and organic solvents and vice-versa. To make this possible, it is necessary to modify the solubility of the nanoparticles which is usually accomplished by modification of its surface via covalent bonding [1] or electrostatic interactions[2]. However, in most of the reported examples once the metallic surface is modified the properties of the nanoparticles are also modified.

What we propose here is not a simple liquid-liquid phase transfer. We have developed a new method for capturing nanoparticles which allows its storage in a solid state and subsequently re-disperse them again in a great variety of organic solvents. Our strategy is based in the use of an aqueous soluble scavenger which precipitates under particular conditions (addition of an inert salt) trapping the nanoparticles. Once the scavenger is re-solved in an organic solvent, the nanoparticles are released without modification of its surface properties.

In order to corroborate our new method, silver nanoparticles have been synthesized in aqueous media in a very simple way [3] (see figure 1) using stark as steric stabilizer and glucose as reducing agent. A polymeric scavenger is added (**A**) with is capable of coagulate after addition of a salt (**B**) capturing the nanoparticles without requirement of surface covalent bonding. This scavenger is filtrated and stored in a solid way (**C**), and it can be dissolved in different organic solvents re-dispersing the nanoparticles (**D**).

In this communication the experimental details and advantages of this novel method of recovering nanoparticles will be presented.

References:

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Figures:

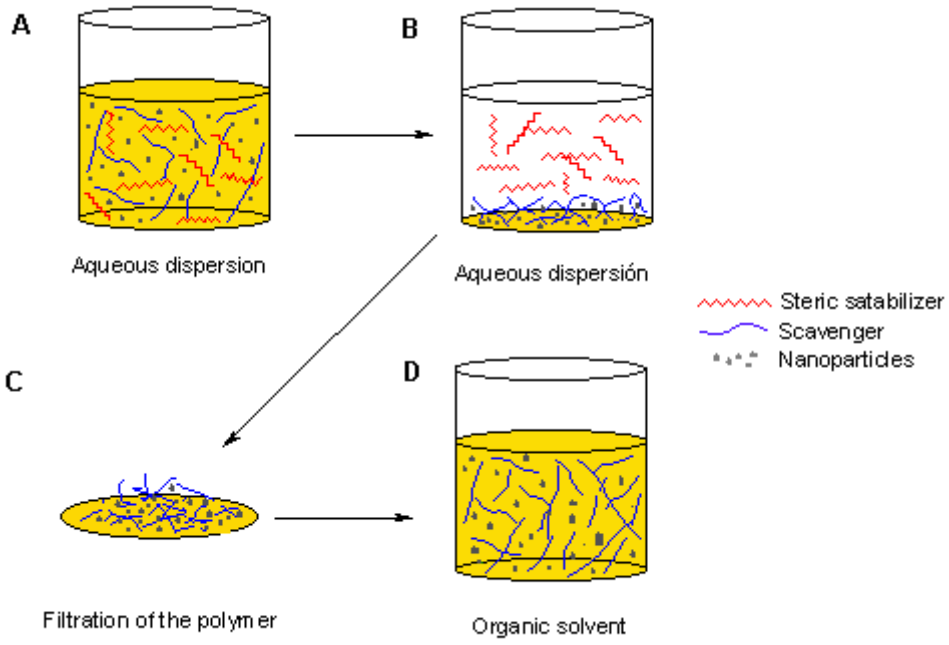

Figure 1: A) Synthesis of silver nanoparticles in water with stark as stabilizer, once the particles are formed, the scavenger of nanoparticles is added. **B**) The scavenger is coagulated and the nanoparticles are trapped in the precipitate. **C**) The scavenger and the nanoparticles are filtered off and dried. **D**) The nanoparticles are dispersed in an organic solvent.