Sonochemical formation of gold nuclei on magnetite nanoparticles and growth to a core-shell system

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Magnetic nanoparticles for selective capture of biomolecules in complex mixtures is gaining momentum in bionanotechnology by providing significant advantages over traditional methods of separation[1]. A magnetite-gold core-shell structure would grant researchers with an integrated detection and "gene fishing" platform by means of the detection properties of gold nanoparticle systems combined with a magnetic component[2, 3].

An ultrasound mediated procedure was employed for *in-situ* formation of gold nuclei on the surface of magnetite nanoparticles. The growth of the gold nuclei on the magnetite to a gold shell layer was achieved by an iterative addition of gold precursor and reducing agent. The growth of the gold layer was followed by T.E.M., UV-Vis and EDS. Several parameters, such as gold precursor concentration, reductant concentration, rate of reagents addition and initial nanoparticle concentration were analysed. Also, different chemical reductants were evaluated for their ability to produce a complete gold shell.

References:

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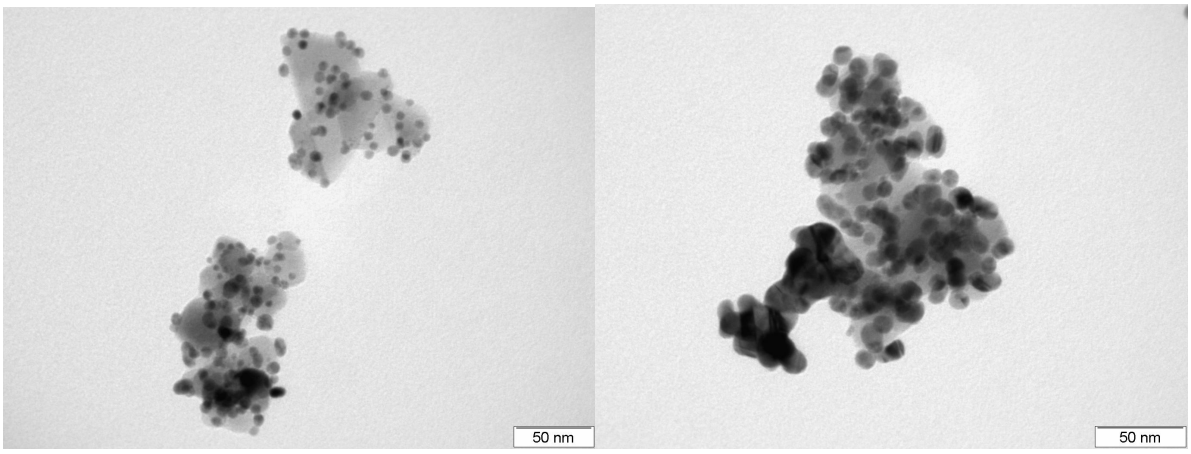

Figure 1- Left: nanoparticles obtained by ultrasound mediated procedure; right: nanoparticles obtained by further addition of gold precursor and reductant.

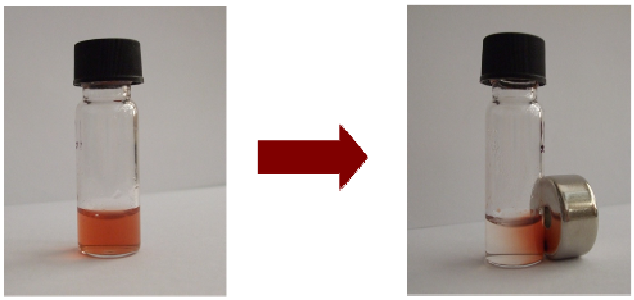

Figure 2 – Magnetic separation of magnetite-gold nanoparticles with a permanent magnet.

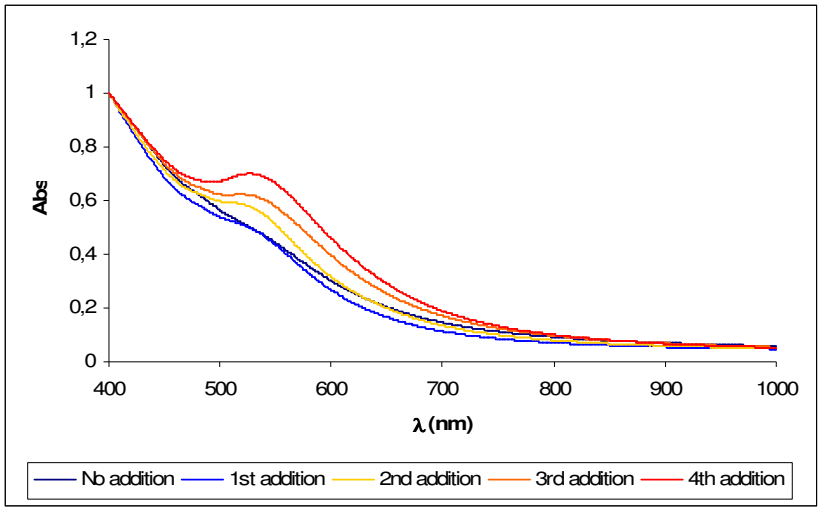

Figure 3 – UV-Vis spectra showing the growth of the gold surface plasmon band through the iterative addition of gold precursor and reducing agent.

Acknowledgments

The authors would like to thank FCT (Fundação para Ciência e Tecnologia) through projects PTDC/BIO/66514/2006; PTDC/QUI/64484/2006 and PTDC/SAU-BEB/66511/2006, and SFRH/BD/28209/2006 to Pedro Quaresma.