MONODISPERSE Fe_3O_4 AND FEPT MAGNETIC NANOPARTICLES FOR SPECIFIC SEPARATION OF OLIGONUCLEOTIDES AND PROTEINS

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The use of magnetic nanoparticles in biotechnology for the selective capture of biomolecules in complex mixtures is an active area of research in the field of nanobiotechnology as it provides significant advantages over traditional methods of separation.

Magnetic nanoparticles composed of either Fe_3O_4 or FePt were produced using acetylacetonate metal precursors resulting in enhanced control over size and monodispersity as confirmed by Transmission Electron Microscopy (T.E.M.)[1]. This control can be achieved by a careful selection of reaction temperature and precursor/capping ratio. Further characterization of their magnetic properties was performed by SQUID.

In order to ultimately develop an integrated detection and "gene fishing" system, a gold coating procedure on the previously synthesized magnetic cores was attempted and preliminary results are discussed[2]. Such a system of core-shell nanoparticles could be applied to a variety of target biomolecules (such as DNA/RNA sequences and proteins) depending on appropriate functionalization through the use of thiol covalent bonds. Furthermore the gold coating would also allow to explore the plasmonic resonance properties of colloidal gold for applications in colorimetric detection of the target biomolecules[3].

References:

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[3] P. Baptista, G. Doria, D. Henriques *et al.*, *J. Biotech.* **119** (2), 111 (2005).

Figures:

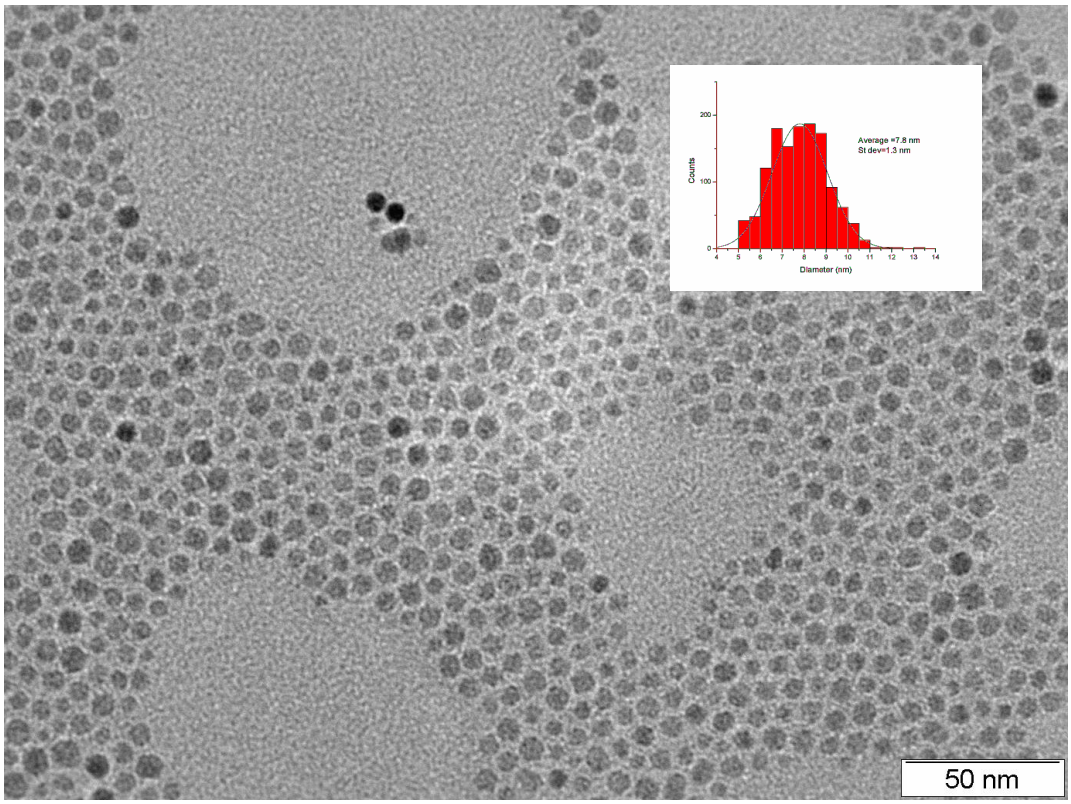

Figure 1 - TEM image of magnetic nanoparticles composed of Fe_3O_4 and corresponding diameter histogram. Average particle size is 7.8 nm.

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