

Metallic nanoparticles: Synthesis, characterisation and application

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Abstract: Colloidal sphere-like gold nanoparticles were prepared from an HAuCl_4 aqueous solution by the chemical reduction method and by using X-ray irradiation, while rod-like gold nanoparticles were synthesised according to the seed-mediated growth method and by sonoelectrochemistry. Gold nanoparticles exhibit fcc structure. Sphere-like gold nanoparticles have a diameter of 20-60 nm, while rod-like gold nanoparticles have an aspect ratio of 2-4. In UV-vis spectra, the absorption bands related to surface plasmon resonance were observed. Co-Pt nanoparticles of 5-20 nm were prepared by electrochemistry, while Fe-Pt nanoparticles with a size of 5-10 nm were prepared by sonoelectrochemistry. After annealing, these magnetic nanoparticles showed a high coercivity. The gold nanoparticles were functionalised for detecting breast cancer cells. Copyright ?? 2011 Inderscience Enterprises Ltd.

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References:

1. Eustis, S., El-Sayed, M.A., Why gold nanoparticles are more precious than pretty gold: Noble metal surface plasmon resonance and its enhancement of the radiative and nonradiative properties of nanocrystals of different shapes (2006) *Chem. Soc. Rev.*, 35, pp. 209-217
2. Liz-Marzan, L.M., Nanometals: Formation and color (2004) *Mater. Today*, 7, pp. 26-31
3. Jain, P.K., El-Sayed, I.H., El-Sayed, M.A., Au nanoparticles target cancer (2007) *NanoToday*, 2 (1), pp. 18-29
4. Sun, S., Murray, C.B., Weller, D., Folks, L., Moser, A., Monodisperse FePt nanoparticles and ferromagnetic FePt nanocrystal superlattices (2000) *Science*, 287, pp. 1989-1992
5. Huang, Y., Okumura, H., Hadjipanayis, G.C., CoPt nanoparticles for high density magnetic recording media (2001) *Magnetic Storage Systems Beyond 2000*, pp. 171-176. , Hadjipanayis, G.C. (Ed.), Kluwer Academic Publishers, Dordrecht
6. Long, N.N., Vu, L.V., Kiem, C.D., Doanh, S.C., Nguyet, C.T., Hang, P.T., Thien, N.D., Quynh, L.M., Synthesis and optical properties of colloidal gold nanoparticles (2009) *J. Phys.: Conf. Ser.*, 187, p. 012026. , 8 pages
7. Zhu, J.J., Aruna, S.T., Koltypin, V., Gedanken, A., A novel method for the preparation of lead selenide: Pulse sonoelectrochemical synthesis of lead selenide nanoparticles (2000) *Chem. Mater.*, 12, pp. 143-147
8. Zana, I., Zangari, G., Magnetic properties of electrodeposited Co-Pt thin films with very high perpendicular magnetic anisotropy (2004) *J. Magn. Magn. Mater.*, 272-276, pp. 1698-1699
9. Atkins, P., (1997) *Physical Chemistry*, , 6th ed., W.H. Freeman and Company, New York
10. Bard, A.J., Faulkner, L.R., (2001) *Electrochemical Methods. Fundamentals and Applications*, , 2nd ed. John Wiley and Sons Inc., New York
11. Zeng, Q., Zhang, Y., Wang, H.L., Papaefthymiou, V., Hadjipanayis, G.C., Magnetic properties and microstructure of fine Fe-Pt nanoparticles prepared by chemical reduction (2004) *J. Magn. Magn. Mater.*, 272-276, pp. e1223-e1225
12. Givord, D., Rossignol, M.F., Coercivity (1996) *Rare-earth Iron Permanent Magnets*, pp. 218-285. , Coey, J.M.D. (Ed.), Clarendon Press, Oxford