

Synthesis of Iron oxide Nanoparticles for 3D Nanostructure Fabrication

A. N. Giakoumaki^{1,2*}, A. Selimis¹, M. Vamvakaki^{1,3}, M. Farsari¹

1. IESL-FORTH, N. Plastira 100, 70013, Heraklion, Crete, Greece

2. Department of Chemistry, University of Crete, Heraklion, Crete, Greece

3. Department of Materials Science and Technology, University of Crete, Heraklion, Crete, Greece

We demonstrate the fabrication of 3D nanostructures by multiphoton polymerization using a material that contains magnetic Iron Oxide Nanoparticles .

Direct fs laser writing by multiphoton polymerization is a technique that allows the fabrication of 3D structures with sub-100 nm resolution. It has been implemented using a variety of purely organic or hybrid materials, for applications in photonics, metamaterials and biomedicine[1-3].

We report here the fabrication of high quality, 3D structures employing a photosensitive material containing Iron oxide Nanoparticles synthesized by thermal decomposition and by laser ablation of a bulk Fe target.

By incorporating the magnetic nanoparticles in a polymer structure we aim to enable their remote manipulation by a magnetic field.

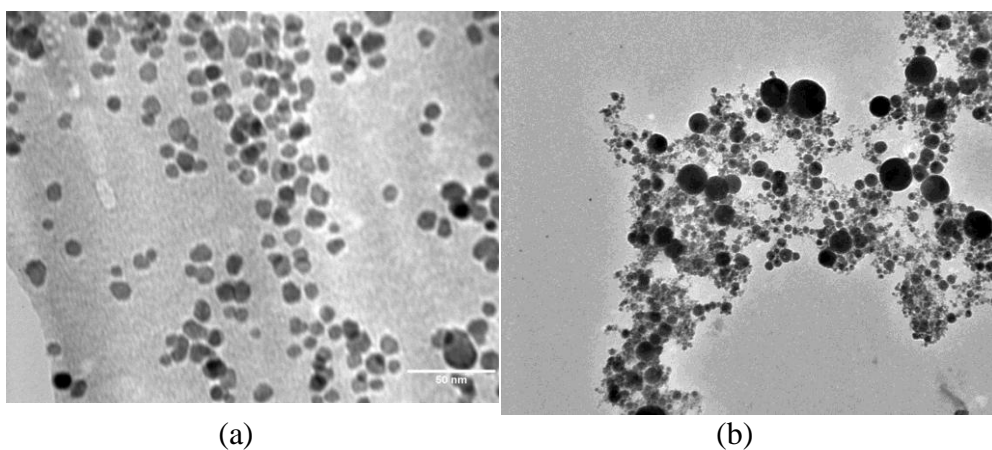


Figure 1 TEM images of iron oxide nanoparticles synthesized (a) chemically by thermal decomposition and (b) laser ablation of a Fe target.

References

[1] I. Sakellari, E. Kabouraki, D. Gray, V. Purlys, C. Fotakis, A. Pikulin, N. Biturin, M. Vamvakaki, M. Farsari, "Diffusion-Assisted High Resolution Direct Femtosecond Laser Writing", ACS Nano, 6 2302 (2012).

[2] N. Vasilantonakis, K. Terzaki, I. Sakellari, V. Purlys, D. Gray, C.M. Soukoulis, M. Vamvakaki, M. Kafesaki, M. Farsari, "Three-Dimensional Metallic Photonic Crystals with Optical Bandgaps", Advanced Materials, 24 1101(2012).

[3] V. Melissinaki, A.A. Gill, I. Ortega, M. Vamvakaki, A. Ranella, J.W. Haycock, C. Fotakis, M. Farsari, F. Claeysens, "Direct laser writing of 3D scaffolds for neural tissue engineering applications", Biofabrication, 3 045005 (2011).

* argyrogia@gmail.com