

## **Institute of Materials Science at NCSR Demokritos (NCSR-D)**

<http://inn.demokritos.gr>

### ***General***

The Institute of Materials Science (IMS) is one of the 8 institutes of the National Centre for Scientific Research "Demokritos" (NCSR-D), the major research centre in Greece. The IMS employing about 70 scientists, PhD students and support personnel is an internationally recognized interdisciplinary research institute with leading groups in the fields of magnetic, semiconducting, and superconducting nanostructured materials for novel magnetic, electronic, and medical (diagnostic and treatment) applications. The activities of the magnetism group (35 people), that is involved in NANOMAG, include hybrid magnetic/superconducting/ semiconducting multi-layer structures for spin-control devices, colloidal magnetic nanoparticles for medical applications, self-assembly of nanoparticles for magnetic recording and integration of metallic magnetic nanoparticles into various nano-patterned substrates and Molecular Magnets. The IMS has been recognized since 2000 as a "Centre of Excellence for Nanostructured Materials in Greece". Dr. D. Niarchos of the IMS group has received the most prestigious EU award for collaborative research, the DESCARTES prize 2005 for the contribution of his group to the HIDEMAR project on High Density Magnetorecording in collaboration with the team of CNR also participating in NANOMAG. Another IMS scientist, Dr. G. Kordas was awarded with an Advanced IDEAS grant of 2M€ Euros ("A Novel Nano-container drug carrier for targeted treatment of prostate cancer" Grant agreement: 232959), to carry out cutting-edge research in the field of nanomedicine. Dr. G. Papavassiliou (Director of IMS) is elected member of the Board of Trustees of EUROMAR, as well as elected member of the AMPERE Committee, the two most important European Organizations in Magnetic Resonance. Members of the group have been involved as coordinators/partners in more than 20 EU funded and other international research projects. Finally members of the IMS group have also organized more than ten international workshops and conferences, some of them in collaboration with the groups of UFLOR, JSI, CNR and UDEL participating in NANOMAG.

### ***Infrastructure***

Excellent facilities for the production of magnetic, metallic/semiconducting/ceramic thin films and multilayers (sputtering, laser ablation, MBE), solid state chemistry and Sol-Gel chemistry for functional nanostructured materials, advanced ceramics and state-of-the art facilities for characterization such as magnetic measurements (VSM, SQUID and ac-susceptibility with up to 12 Tesla superconductive magnets), NMR in 2.35, 4.7, and 8 Tesla, X-band and Q-band EPR, Mossbauer spectroscopy, XPS, Single crystal and powder XRD, SEM, HRTEM AFM/MFM, PPMS and computer clusters for Computational Physics.

The role of IMS team in the consortium will be to train people in the use of the above characterization and growth techniques (prominently sputtering, chemical growth and EPR), to exchange expertise and contribute to the (i) synthesis and characterization of manganites

and iron oxide based bulk, nanoparticles, thin films and molecular based magnets (ii), functionalization of biomedical nanoparticles, (iii) fabrication of prototype spintronic devices and (iv) fabrication of HPPMagnets, (v) Modeling of the magnetic behavior.

### ***Key scientists***

*Dr. G. Papavasiliou* (Director of IMS, Coordinator) NMR spectroscopy, manganites, nanoparticles for MRI applications, *Dr. D. Niarchos*. magnetic materials and nanostructures for recording media, permanent magnets and biomedical applications, *Dr. K. Trohidou* Computational modeling of nanostructures and magnetic nanoparticles, *Dr. A. Dimoulas* MBE growth and characterization of oxide and semiconducting thin films, *Dr. M. Pissas*, Solid State Chemistry, Strongly Correlated Electron Systems, Magnetic Measurements, Neutron Scattering, *Dr. Y. Sanakis* EPR spectroscopy, molecular based magnets, *Dr. N. Boukos* TEM, SEM of complex nanostructures, *Dr. V. Psycharis* X-Ray crystallography, *Dr. A. Raptopoulou* synthesis of Molecule/Organic-based-Magnets, *Dr. A. Boudalis* synthesis of Molecule/Organic-based-Magnets. *Dr. V. Tzitzios* chemical growth of magnetic and complex functional nanoparticles, *Dr. D. Stamopoulos* magnetic and superconducting thin films and nanostructures, *5PhD students*.