NATIONAL INSTITUTE OF RESEARCH & DEVELOPMENT FOR TECHNICAL PHYSICS

DIRECTOR: Prof. Dr. Horia Chiriac
(hchiriac@phys-iasi.ro)

RESEARCH ACTIVITIES:

preparation of new materials with superior physical properties: magnetic and non-magnetic amorphous and nanocrystalline materials (bulk materials, ribbons, wires, glass-covered wires, powders and thin films)

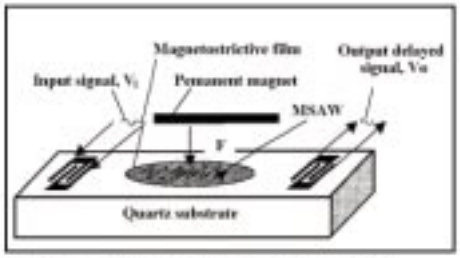
- materials with thermoelectric and elastoresistive properties, bulk or thin films
- nanocrystalline oxidic and composite materials as powders and ribbons
- nanostructured permanent magnets

elaboration of new microdevices based on thin film technology (magneto-surface acoustic microdevices, magneto-mechanical microsensors, electrostatic and electromagnetic microswitches, microinductors and microtransformers)

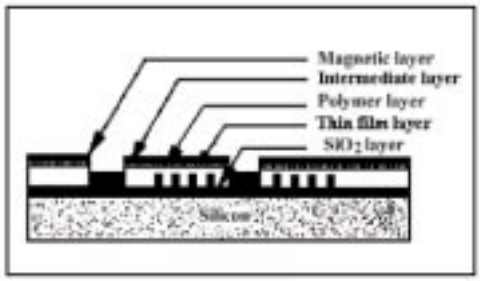
elaboration of new equipment based on magnetic amorphous and nanos-tructures materials (new types of sensors and transducers of pressure, force, tor-sion, displacement, magnetometric sensors, eddy current transducers, trans-formers, cores a. s. o.)

development of new physical methods enabling the study of the magnetic field, magnetic separation, and non-destructive control by means of electromag-netic techniques

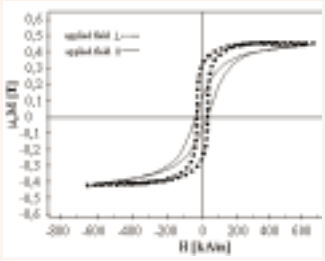
MICRODEVICES



Magneto-surface acoustic microdevice

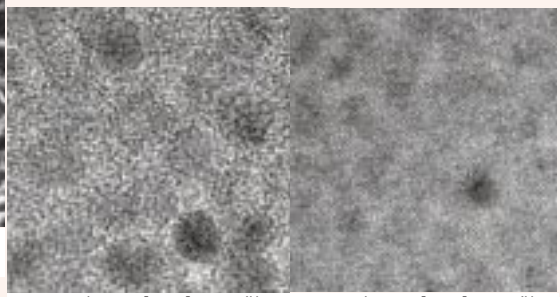


Magnetic thin –film inductor



Hysteresis loops of the $Ni_{80}Fe_{20}$ nanowire arrays obtained in nanoporous alumina membrane, with diameter of the nanowires of about 200 nm and length of about 60 μm.

SEM on $Ni_{80}Fe_{20}$ nanowire array after dissolution of the membrane.



HRTEM: $Nd_{50}Fe_{40}Al_{10}$ melt-spun ribbon thickness: 25 mm

HRTEM: $Nd_{50}Fe_{40}Al_{10}$ melt-spun ribbon thickness: 120 mm

Contact data for a few networks financed from MATNANTECH (National Programme for R&D in New Materials, Micro and Nanotechnologies)

NANOTECHNET
Network of Research Laboratories in Nanotechnologies
Prof. Dan Dascalu (dascalu@imt.ro)
Dr. Marius Bazu (mbazu@imt.ro)
Web page:
http://www.imt.ro/NANOTECHNET

BIONANONET
Network of Research Laboratories in Micro and Nanobioengineering
Prof. Dan Dascalu (dascalu@imt.ro)
Biol. Roxana Vasilco (roxanav@imt.ro)
Web page: www.imt.ro/BIONANONET

CENOBITE
Centre of Research in Nanobiotechnologies
Prof. Dan Dascalu (dascalu@imt.ro)
Dr. Marius Bazu (mbazu@imt.ro)
Web page: www.imt.ro/cenobite10

Our Institute is open to pro-posals for collaboration with partner institutes or research groups with the same research interests.
Contact person:
Prof. Dr. Horia Chiriac,
tel: +40 32130680,
fax: +40 32 231132,
email: hchiriac@phys-iasi.ro;
http://www.phys-iasi.ro.

Glassy hard magnets with nano-scale clusters

Investigations on Nd-Fe-(Al,Si) bulk amorphous alloys showed the following general features: (i) large coer-cive fields in the as-cast state for $Nd_{60}Fe_{30}Al_{10}$ bulk amor-phous alloys and soft magnetic behaviour for the similar melt-spun thin ribbons; (ii) large coercive fields in the as-cast state for both amorphous ribbons and bulk samples containing less than 60 at. % Nd and for those in which Al is substituted by Si; (iii) a strong dependence of the coer-cive field on the quenching conditions and temperature; (iv) weak ferromagnetic behaviour after crystallization.
The clusters are dispersed more homogeneously in thick ribbons than in thin ones leading to a higher mag-netic percolation limit, and consequently the larger coer-cive fields up to 5 T in the as cast-state for 120 mm ribbons in comparison with 1-2 T for 25 mm ribbons.