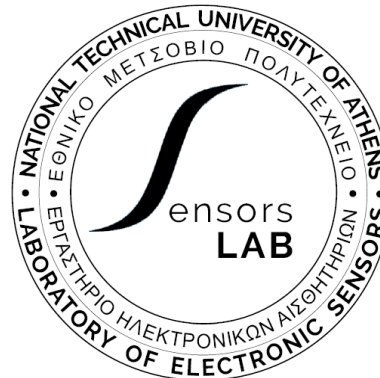# National Technical University of Athens

Laboratory of Electronic Sensors

Athens 2021

Our core subjects

- **M**aterials & **A**pplications for **S**ensors & **T**ransducers (MAST)
  - **Crack prediction in steels & faultless steel production**
  - Sensors based on magnetic materials
  - Optic sensors & magneto-optic applications
- **H**ybrid **El**ectric Energy & **En**vironment **I**ntegrated **C**luster (HELENIC)
  - **Renewable fuels** (**υδρογόνο**, **πυρόλυση & βιοκαύσιμα**)
  - Storage (batteries – supercapacitors – thermal storage * monitoring)
  - Smart cities (smart metering – smart roads – smart resilience)
- **He**ath & **Li**fe **X**plorers (HELIX)
  - **Smart sensors** & **selective magnetic separation**
  - Theragnostics (MPI & Cancer, Anti-thromb catheters, Magnetocardiograms)
  - Water Structures for Advanced Therapeutic & Engineering Research (WATER)

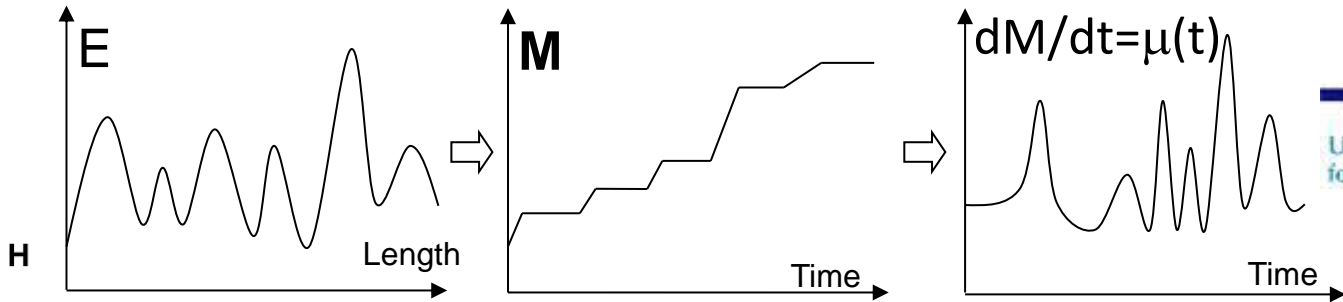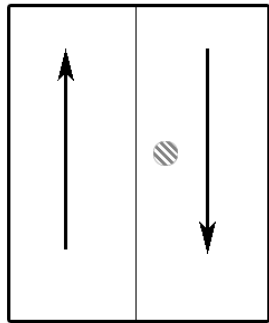7 Postdoctoral Fellows, 22 PhDs, 3 Engineers, 1 Secretary

# Steel health monitoring – Faultless steel production
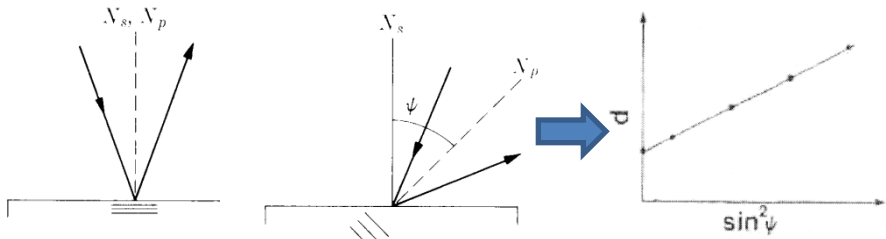
X-Ray Bragg-Bretanno for surface & neutron diffraction for bulk residual stress type II determination
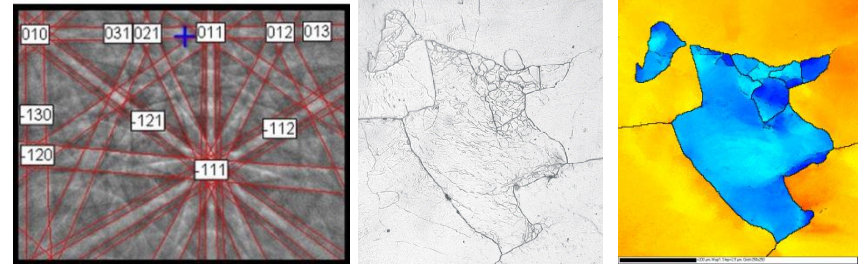
Electron Back Scattering Diffraction for stress type III determination

E

H

Length

M

Time

$dM/dt = \mu(t)$

Time

Universal Network for Magnetic NDE

Stress fields prohibit the maqnetic domain walls to propagate ➔ Affecting Barkhausen noise (BHN) & magnetic permeability ➔First time in history
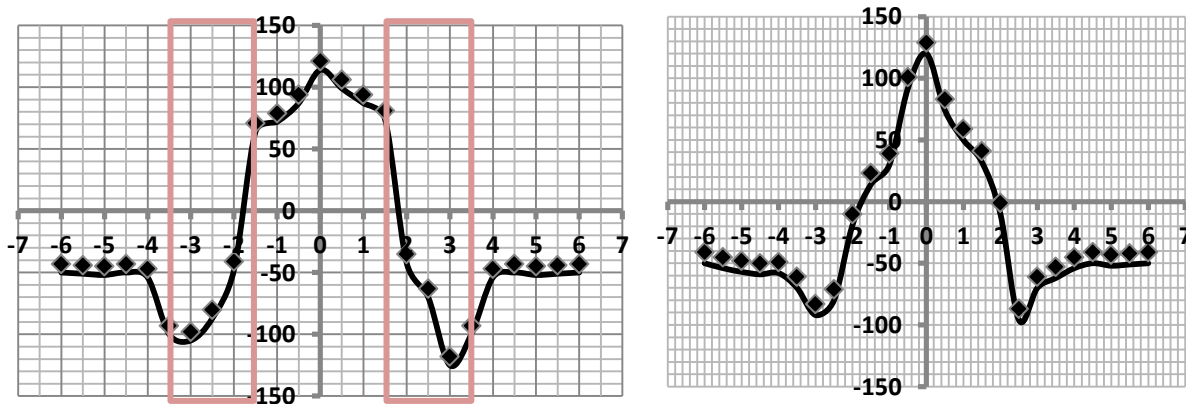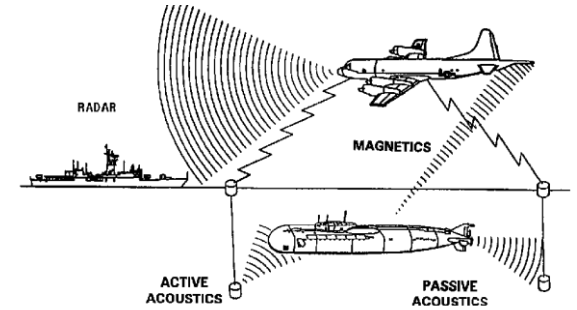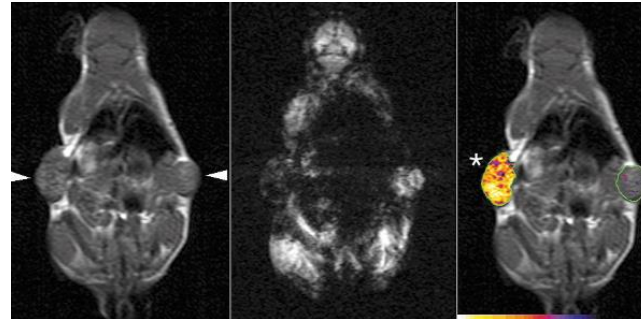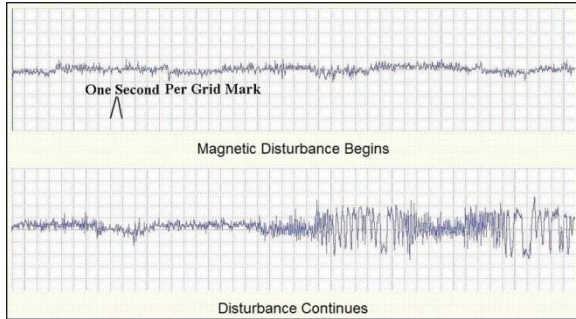
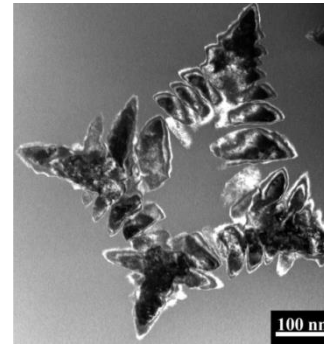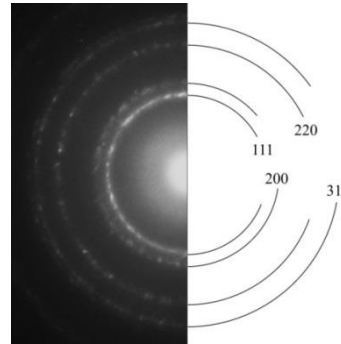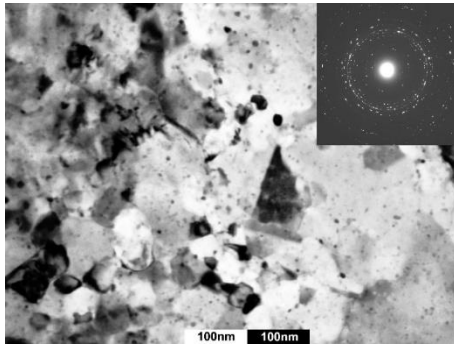

Point measurements: residual stresses – Continuous line: permeability

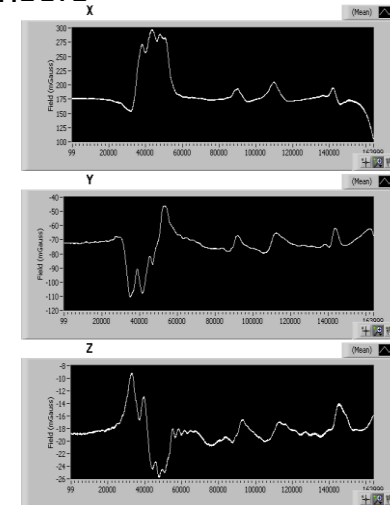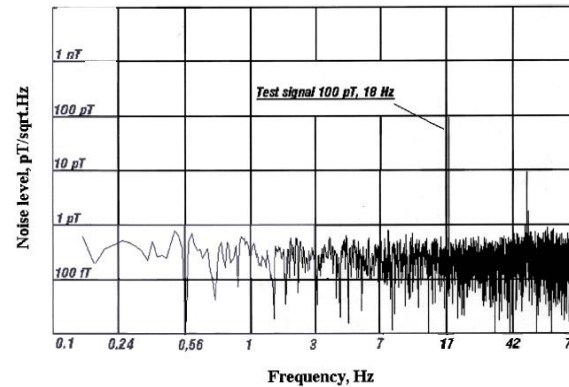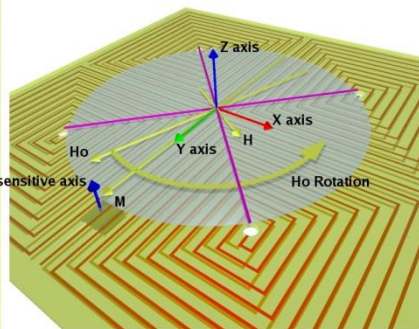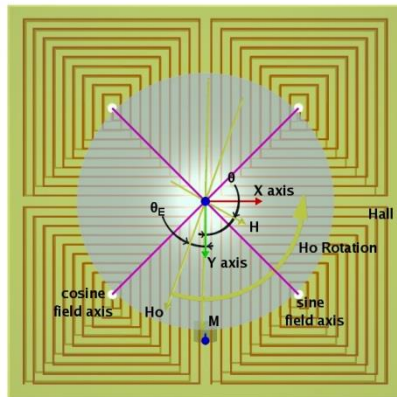Applications in shipping, steel industry, structured

Ultrasensitive magnetometers & hydrophones

Several applications in biomedicine, geophysics, defense, etc.
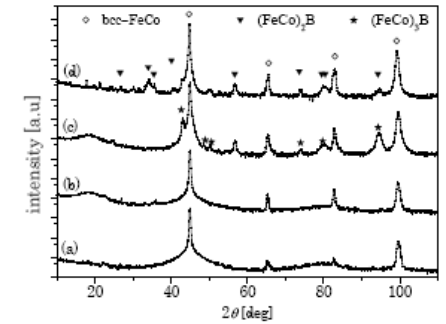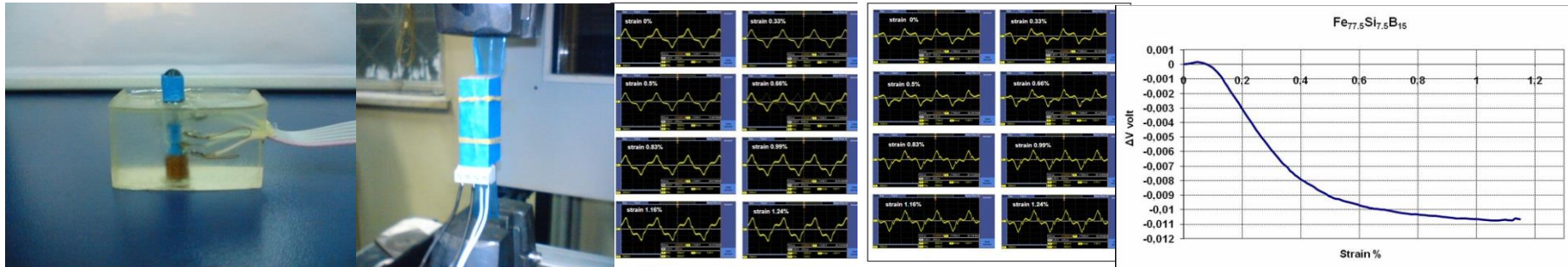

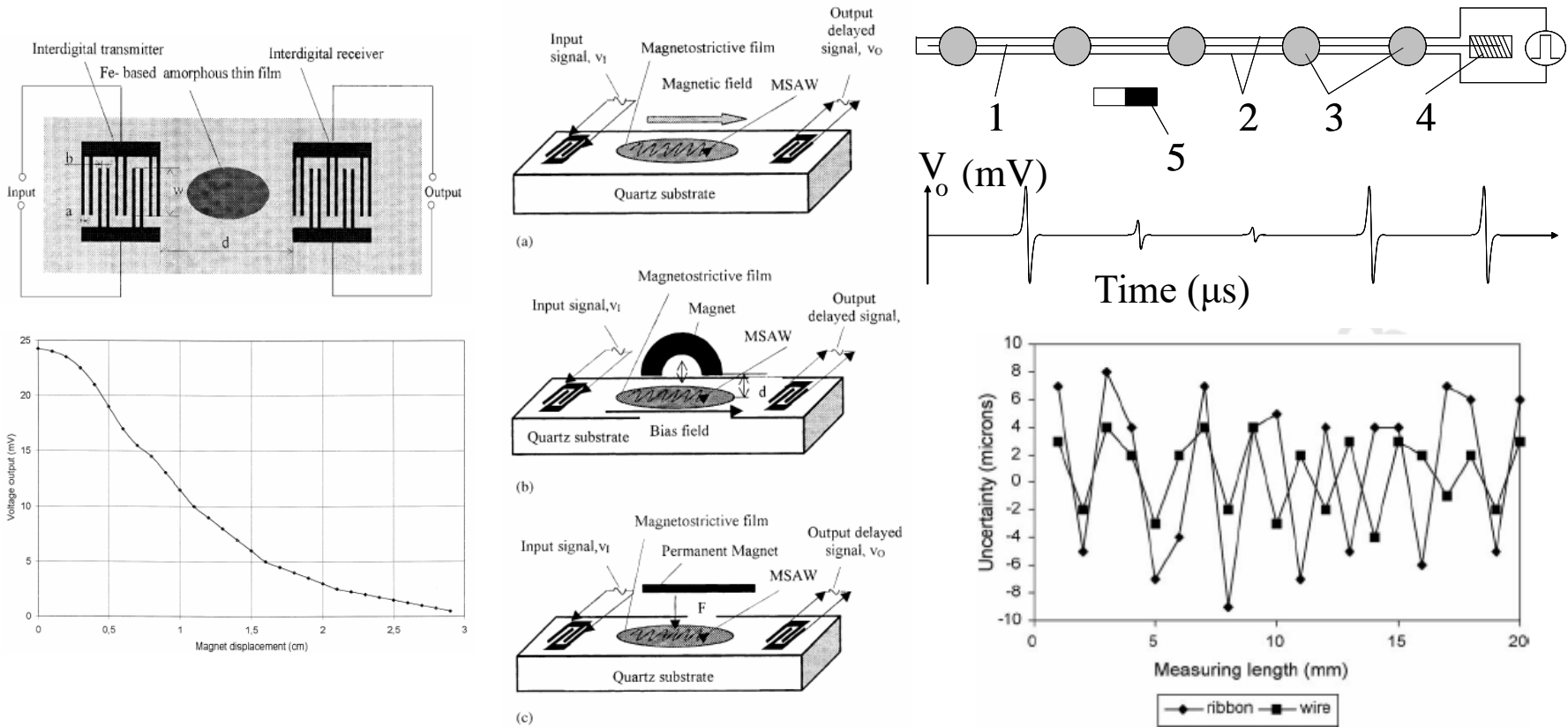Well proven experience in developing & characterizing materials for sensors

Our calibrated magnetometers & hydrophones have been used for several applications
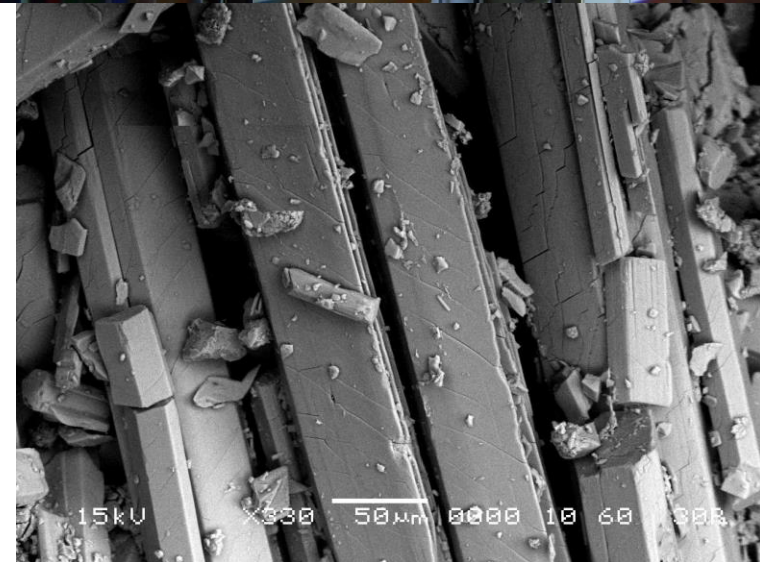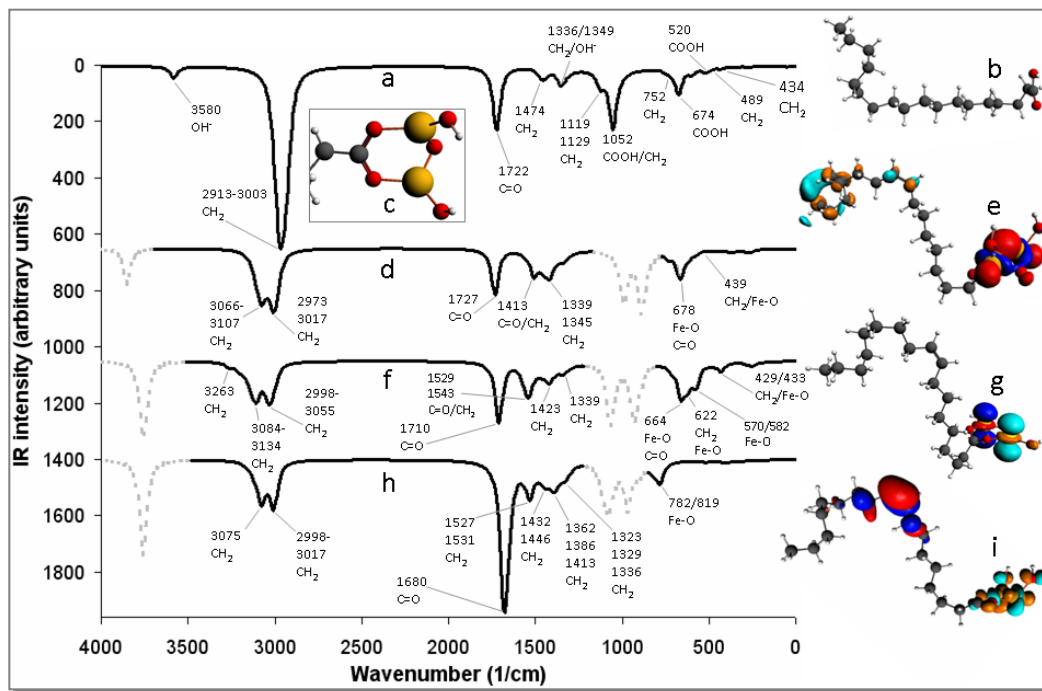
Sensors based on magnetic materials
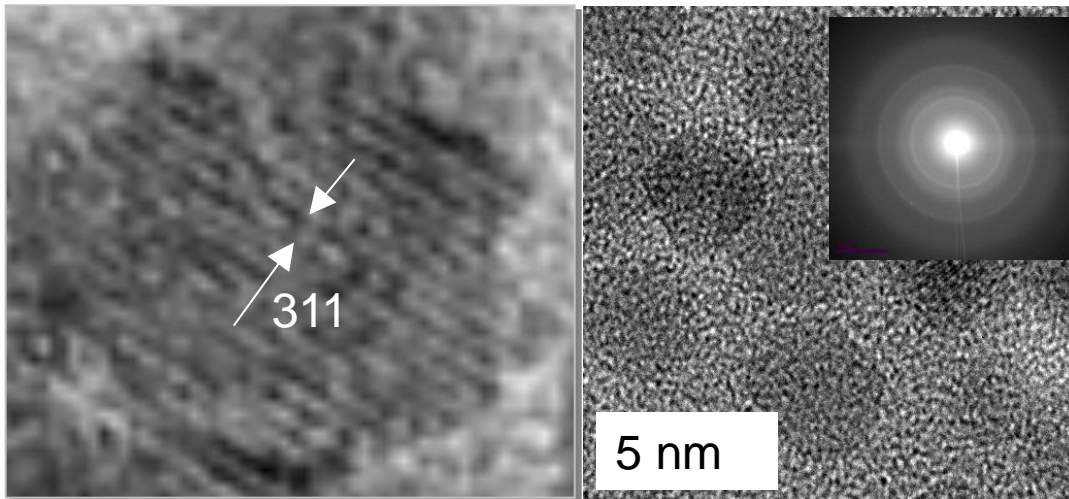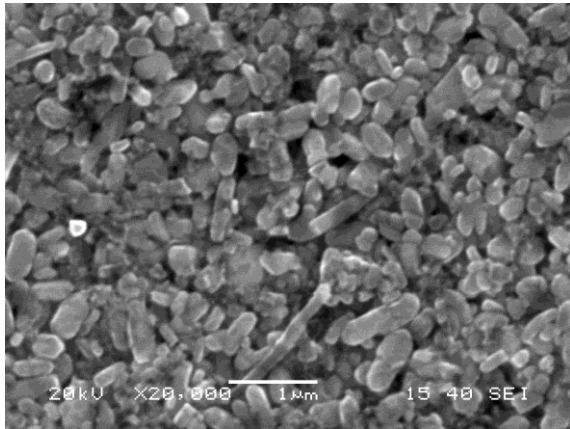

Magnetic sensors with applications in aeronautics

Magnetostrictive delay lines for position and stress sensors

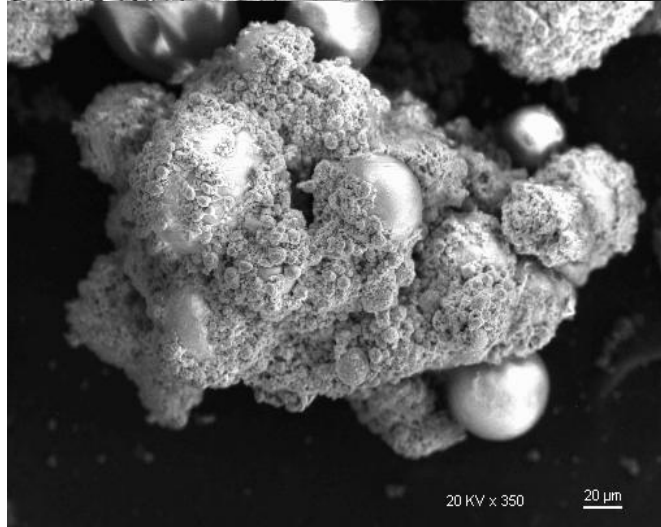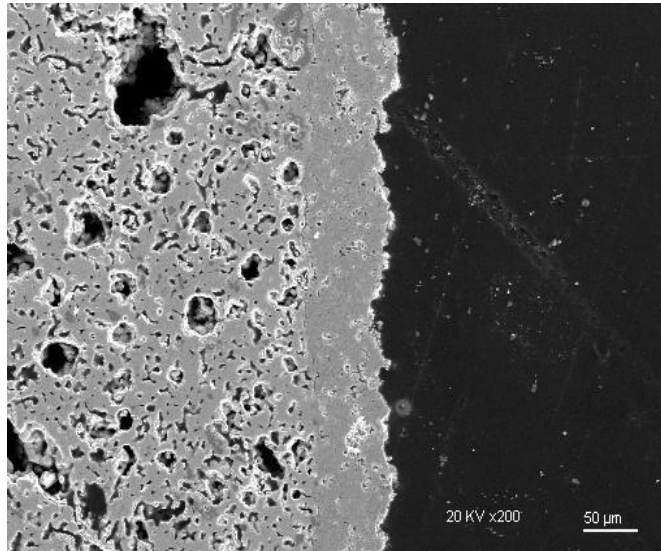# Development – Characterization – Simulation of nanomaterials

Indicative (energy) applications
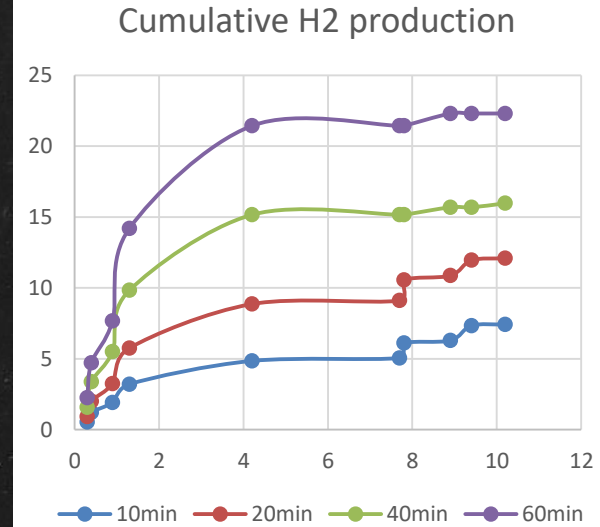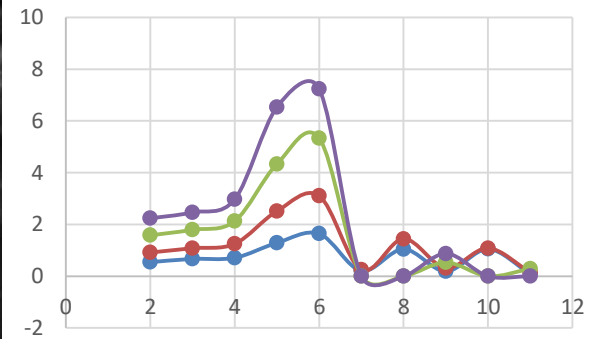

Li batteries

Solid oxide fuel cells

Hydrogen production