

Project:

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Manager:

Prof.dr.eng.phys. Ionel Chicinaș

Tel. 0040726226083

e-mail: ionel.chicinas@stm.utcluj.ro

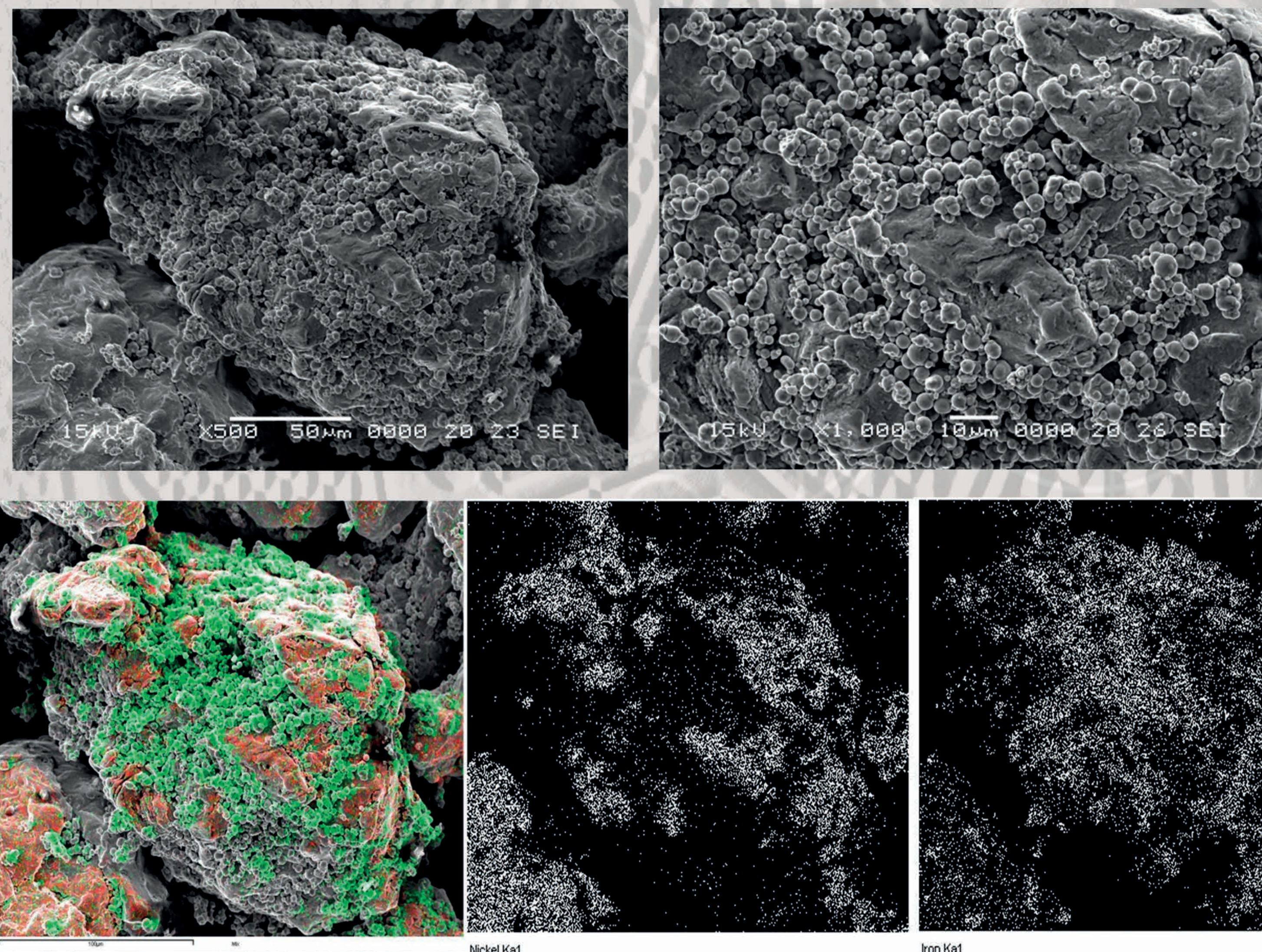
Objectives:

OBJECTIVE 1:

Nanocrystalline/nanostructured powders and sintered compacts like Permalloy (Supermalloy)/ Rhometal type.

OBJECTIVE 2:

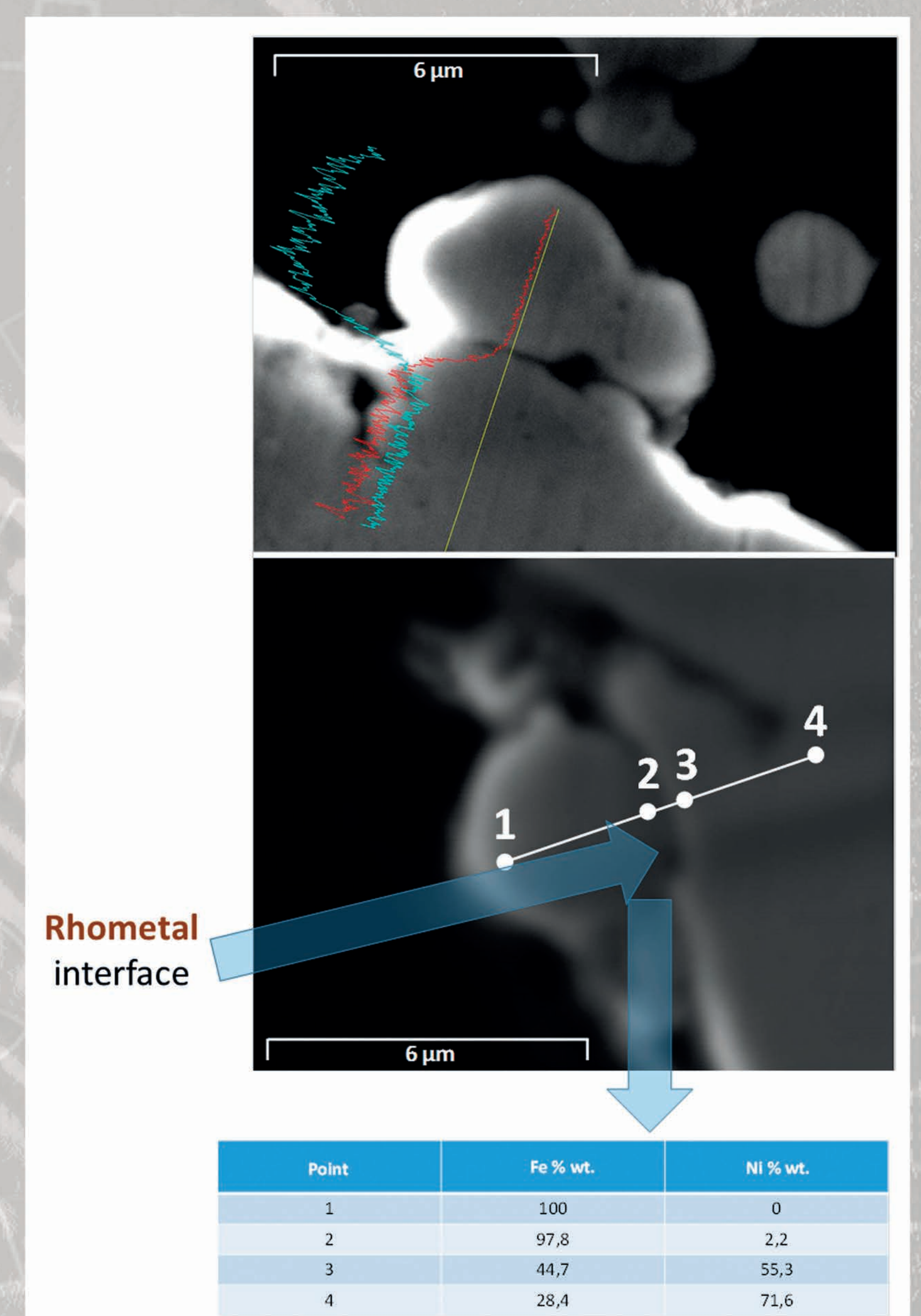
(Me₁Me₂)Fe₂O₄/(Fe, Fe-Ni alloy) nanocomposite powders and compacts.



Nanocrystalline Ni₃Fe particles are covered by a discontinuous thin layer of Fe particles

Achievements:

The project is structured on two directions: (i) obtaining of nanocrystalline/nanostructured powders and sintered compacts like Permalloy(Supermalloy)/ Rhometal type and (ii) obtaining of nanocomposite powders and compacts by combining the high permeability/remenance of Fe, Fe-Ni alloy with high electrical resistivity of ferrite - (Me₁Me₂)Fe₂O₄/(Fe-Ni alloy). Two types of nanocomposite powders are envisaged: (i) the nanocomposite particles like “raisin bread” model, obtained by milling of Fe-based alloys (ductile) and ferrite powders (brittle) and (ii) a core-shell type particles obtained by microalloying between the large particles of alloy surrounded by many nanosized ferrite particles. The nanocomposite/ nanostructured powders will be compacted by spark plasma sintering to preserve the phases composition and nanocrystalline state. The proposed research aims to optimize the microstructure influence on the magnetic coupling and electrical resistivity in nanocomposite powders and sintered compacts.



Application fields:

High performance magnetic material presents a special interest for electrotechnical industry, aeronautic, auto industry, computers' industry. The industrial implementation of magnetic cores obtained by powder metallurgy is a very attractive and actual direction of applicative researches with strong influences on the market and environment. New nanocrystalline/ nanocomposite soft magnetic materials could be used like magnetic cores at medium and high frequencies, but with better magnetic properties than soft magnetic ferrites.