

Structural and Magnetic Transformations in Nickel-Carbon Nanocomposites

Initiative: Zwischen Europa und Orient - Mittelasien/Kaukasus im Fokus der Wissenschaft

Bewilligung: 18.02.2013

Laufzeit: 2 Jahre

It is proposed to synthesize Ni_x/C nanocomposites which allow to stabilize metallic Ni (protected by carbon coating) and protect it from environmental influences (e.g. oxidation) which would lead to an immediate degradation of the magnetic properties. The correlation of morphology, structure and size of the Ni constituent ($0 < x < 0.03$) with the overall magnetic properties in a wide temperature range will be analyzed. These nanocomposites will be prepared by solid-phase pyrolysis of solid solutions of Ni(C₃₂N₈H₁₆)-H₂(C₃₂N₈H₁₆) phthalocyanines. A unique feature of the proposed method is the possibility to prepare carbon-coated Ni particles of any required size: from small clusters and superparamagnetic particles to single- and multidomain ferromagnetic spherical nanoparticles of up to 300-400 nm in diameter. The concentration and size of Ni particles can be controlled both by the weight ratio of initial phthalocyanines and by pyrolysis conditions. Optimized synthesis routes for size control in the final product will be developed. It is expected that the project will allow to reveal the nature of structural and magnetic transformations in nickel-carbon nanocomposites and obtain materials with tailored magnetic characteristics.

Projektbeteiligte

Prof. Dr. Michael Farle

Universität Duisburg-Essen
Fakultät für Physik
Experimentalphysik
Duisburg

Dr. Aram Manukyan

National Academy of Sciences of Armenia
Institute for Physical Research
Ashtarak
Armenien