

Project 4.8 Synthesis and structural investigation of bundles of carbon nanotubes filled with magnetic halide phases (experimental)

Supervisor: dr hab. Piotr Dłużewski

Institute: IF PAN

Unit: SI 1.4

www: <http://www.ifpan.edu.pl/SL-1/html/s-sl14.html>

Background:

The project is devoted to the advanced molecular scale structures, consisting of bundles, 2D and 3D networks of aligned carbon nanotubes filled with highly crystallographically aligned magnetic halide phases. Due to the pressure of the walls of the nanotubes, the classic limits of thermodynamics of crystals can be exceeded using this type of approach. We assume that the cleaned, refined and oriented filled nanotube bundles will create magnetic 2D and 3D superstructures which will have unusual magnetic properties.

Aim:

The project, will be carried out in the frame of NCN project “In-situ TEM determination of the structure and nanomagnetism of bundles of carbon nanotubes filled with aligned magnetic phases” performed in scientific cooperation with the University of Warwick (Prof. Jeremy Sloan group <https://warwick.ac.uk/fac/sci/physics/staff/academic/jsloan/>).

We propose for Ph.D. candidate a program of research to synthesis, refine, align and characterize the formation of aligned magnetic phases in of single walled carbon nanotubes (i.e. SWCNTs) using in particular metal halides of iron and others transition metals.

More information about NCN project can be found <https://ncn.gov.pl/sites/default/files/listy-rankingowe/2021-03-15bhga1/streszczenia/523873-en.pdf>

Requirements:

- the master degree in physics or chemistry,
- ability to work in a chemical laboratory,
- sufficient proficiency in English,
- knowledge of the basics of crystallography,

Funding:

Scholarship: grant funding of 5000 PLN per month, before subtracting obligatory employer and employee social security contributions (~15%), for 45 months. Afterwards, standard Polish PhD scholarship (about 3240 PLN/month net).

Contact: kret@ifpan.edu.pl, dluzew@ifpan.edu.pl