

Project 3.11 Mechanochemical synthesis of hybrid inorganic-organic functional materials

Supervisor: prof. dr hab. inż. Janusz Lewiński

Institute: ICP PAS Group

Unit: Coordination metal complexes and functional materials - Research group no. 9

WWW: <http://lewin.ch.pw.edu.pl>

Background:

Mechanochemistry, i.e. conducting chemical reactions with the use of mechanical forces, has gained importance as an effective, clean and environmentally friendly synthetic approach for new functional materials. It allows to obtain the desired products with high yield in just a few minutes without the use of large amounts of solvents. Moreover, in many cases the mechanochemical approach affording products unavailable with other methods. The parent research group is developing new mechanochemical methods for synthesis of hybrid inorganic-organic functional materials, which paves the way for efficient synthesis of MOFs (Chem. Commun., 2015, 51, 4032), including drug-loaded materials (Eur. J. Inorg. Chem., 2020, 796), as well as halide perovskites for photovoltaic applications (Acc. Chem. Res., 2019, 52, 3233).

Aim:

The proposed PhD project is focused on further development of mechanochemical synthetic approaches for novel functional materials including MOFs and perovskites for photovoltaic applications. The proposed research may lead to the development of new highly effective pathways for obtaining materials with unique properties, which may result in new applications.

Requirements:

- University degree in chemistry
- Experience in laboratory work in the field of inorganic, organic and coordination chemistry
- Experience with the use of a Schlenk line and manipulation involving air-sensitive compounds
- Knowledge of methods: ¹H, ¹³C and DOSY NMR, IR spectroscopy, mass spectrometry, elemental analysis, UV-Vis spectroscopy and basic X-ray crystallography
- Good command in English, communication skills and predispositions to work in a team