Towards increasing demand for computing power and approaching limits of minimal size of computing and memory units, there's growing interest in research of spintronic materials as a next step in the development of these aspects of information technology. These materials are distinctive due to spin crossover (SCO) induced by variety of factors such as temperature, pressure, specific wavelength light irradiation or electric and magnetic field. The SCO materials are metal-organic crystalline structures with characteristic ferromagnetic/antiferromagnetic properties such as presence of hysteresis loop. Due to the fact, that spin crossover causes alterations in crystalline structure of the material, examination of spin state is possible using macroscopic properties such as radiation absorption ,Raman scattering or magnetic susceptibility.

In the project it is proposed to apply matrix assisted pulsed laser evaporation (MAPLE) technique as a deposition method for thin films of SCO materials. Due to high fragility of these structures, deposition techniques based on thermal evaporation (i.e. PVD) or direct laser ablation (i.e. PLD) cannot be used. The main superiority of MAPLE in comparison to other deposition methods is presence of additional matrix material in the target, that absorb laser energy and protect fragile SCO material.

The main objective of this project is to obtain the knowledge about the physico-chemical processes occurring during laser ablation of complex targets consisting of cryogenically solidified organic solvents and suspended nanocrystalline spin crossover materials (SCO). The research will concern influence of laser radiation and process parameters for structure of SCO nanoparticles. The research will concern among others optimization of deposition conditions for selected spintronic materials (such as $Fe(pz)Pt(CN)_4$, $RbMnFe(CN)_6$, $[Fe(NH_2trz)_3](NO_3)_2$, $[Fe(Htrz)_2trz]BF_4$) and investigation of the influence of laser energy density, pressure in deposition chamber, type of applied matrix and temperature of the substrate and the target. As a results of the project it is expected to obtain homogenous thin film structures characterised with SCO properties in chosen conditions. In order to examine properties of thin films various material analysis will be performed. X-ray diffraction technique will allow to determine maintenance of crystalline structure of the thin film. Optical microscopy and scanning electron microscopy will reveal thin film morphology and deposition quality. At last, temperature dependent Raman and absorbance spectroscopy measurements will allow to determine spin crossover properties. Obtained results will be collated and analyzed to optimize deposition process and maximize quality of deposited thin films.