



POLISH NATIONAL AGENCY
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PROGRAMME

<p>name of the unit:</p> <h2>SOLID STATE CHEMISTRY AND CRYSTAL ENGINEERING GROUP</h2> <p>Institute of General and Ecological Chemistry., Lodz University of Technology</p>		<p>symbol:</p> <p>I-31</p> <p>http://www.ichoie.p.lodz.pl</p>
<p>head of the unit:</p> <p>Agata Trzęsowska-Kruszyńska, PhD, DSc, TUL Prof.</p>	<p>potential promoters:</p> <p>Agata Trzęsowska-Kruszyńska, PhD, DSc, TUL Prof.</p>	<p>contact person:</p> <p>Agata Trzęsowska-Kruszyńska, PhD, DSc phone: 48-42-631-37 agata.trzesowska@p.lodz.pl</p>
<p>scope of activities:</p> <p>The main areas of interest and research directions are:</p> <ul style="list-style-type: none">• design and synthesis of nanoparticles of binary inorganic compounds with potential applications• studies on the influence of the molecular and supramolecular structure of organic and coordination compounds on their fluorescent properties• study of intermolecular interactions in supramolecular systems by computational methods• polymorphism and new forms of organic compounds		<p>graphic material</p>   
<p>present activities:</p> <p>Solid State Chemistry and Crystal Engineering Group carries out works related to the crystal and molecular structure of organic and coordination compounds in order to explain their properties or the mechanism of chemical reactions. X-ray structural, UV-Vis-IR spectroscopic (including spectrofluorimetric), thermal analysis and computational methods are used. The relationships between the structure and properties of selected compounds with potential application in biology, medicine and industry are investigated.</p> <p>We are currently studying the possibility of controlling both size and morphology of the nanoparticles by intentional modifications of a precursor structure since different size and morphology of metal oxide nanoparticles leads to different applications, for example photocatalytic degradation of dyes. In addition, we conduct research on a wide group of new N-heterocyclic organic compounds, including Schiff bases, showing fluorescent properties in the solid state. The research covers the design, synthesis, optimization of crystallization and characterization of the obtained products. We focus our research on determining the influence of low structural variability on the molecular packing and fluorescence properties of the obtained products.</p>		
<p>Future activities:</p> <p>Designing and synthesis of coordination compounds which can serve as precursors for production of nanoparticles with demanded size and shape. Development of new effective fluorophores emitting light mainly in the red range.</p>		
<p>Keywords:</p> <p>crystal and molecular structure, polymorphism, structure – properties relationship, coordination compound, nanoparticles</p>		



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List of internship proposal in this research team:

- Functional solid state fluorescent materials: structural and spectroscopic studies
- Coordination compounds as precursors of nanoparticles

List of attachments:

- Rauf, S., Trzesowska-Kruszynska, A., Sierański, T., Świątkowski, M., Copper(II) 2,2-bis(hydroxymethyl)propionate coordination compounds with hexamethylenetetramine: From mononuclear complex to one-dimensional coordination polymer (2021) *Molecules*, 26 (11), art. no. 3358.
- Poręba, T., Świątkowski, M., Kruszyński, R., Molecular self-assembly of 1D infinite polyiodide helices in a phenanthroline salt (2021) *Dalton Transactions*, 50 (8), pp. 2800-2806.
- Azam, M., Kumar, U., Olowoyo, J.O., Al-Resayes, S.I., Trzesowska-Kruszynska, A., Kruszyński, R., Islam, M.S., Khan, M.R., Adil, S.F., Siddiqui, M.R., Al-Harhi, F.A., Alinzi, A.K., Wabaidur, S.M., Siddiqui, M.R., Shaik, M.R., Jain, S.L., Farkhondeh, M.A., Hernández, S., Dinuclear uranium(vi) salen coordination compound: An efficient visible-light-active catalyst for selective reduction of CO₂ to methanol (2020) *Dalton Transactions*, 49 (47), pp. 17243-17251
- Kędzia, A., Kudelko, A., Świątkowski, M., Kruszyński, R., Microwave-promoted synthesis of highly luminescent s-tetrazine-1,3,4-oxadiazole and s-tetrazine-1,3,4-thiadiazole hybrids (2020) *Dyes and Pigments*, 172, art. no. 107865.