



The Janko Jamnik doctoral scholarship topics for prospective young researchers in the field of chemistry and related sciences

Title	Content	Mentor	Departments
Cancer Immunotherapy	Introduction of safety mechanisms of therapeutic T-cells (CAR T-cells).	Roman Jerala	D12/D11/D01
Designed nanomaterials	Design of genetically encoded polypeptide cages on the basis of modular interactions.	Roman Jerala	D12/D11/D01
Photo-catalytic preparation of bio-based green compounds	As opposed to most substances, which are at present produced from fossil raw materials using wasteful processes, photo-catalysis is based on the use of solar energy that would be used to convert biomass into bio-based compounds.	Blaž Likozar	D13/D09
Processes of electrolytic conversion of CO ₂	In addition to biomass, CO ₂ represents the only permanent source of carbon raw materials, but today it is converted to e.g. methanol, urea ..., for which we need hydrogen, which is obtained by electrolysis. A direct electro-catalytic conversion provides significant improvement.	Blaž Likozar	D13/D10
Catalytic nanofactory for fuel production	Development of modern and multifunctional heterogeneous catalysts based on transition metals for the production of liquid fuels from waste materials.	Albin Pintar	D5/D01
Nanoplasmonic hydrogen synthesis	Synthesis of hydrogen from water by a nanoplasmonic photocatalytic process on the surface of sunlight-excited nanomaterials: theoretical modelling and experimental confirmation.	Albin Pintar	D05/D10/D01
Designing electrolytes	Designing electrolytes optimal for use in DSSC solar cells or batteries.	Ivo Jerman	D10/D01
Non-coding RNA during cellular stress response	Response to stress conditions in the form of gene expression regulation is often mediated via non-coding RNAs. The structure of these RNA molecules is key for understanding interactions with DNA, mRNA, transcription factors, and the like.	Peter Podbevšek	D15/D11
Low-temperature photo- and thermo-catalytic conversion of methane and CO ₂ in selected reactions	Efficient use of the thermal and luminous energy of the visible part of the spectrum for the catalytic conversion of methane and CO ₂ on morphologically defined nanomaterials.	Petar Djinović	D05/D13
Organic lipid membrane mimetics	Synthesis of block copolymers for the preparation of organic lipid membrane mimetics for the insertion of protein pores.	Ema Žagar	D07/D11
Modelling bioactive materials	Finding the links of the structural and dynamic properties of amorphous and crystalline biomaterials with their biological activity through atomistic simulations.	Franci Merzel	D01/D10/D11
Disruptors of protein structure in association with the onset of amyloid fibril formation	In order to test the hypothesis that protofibril formation is triggered by induced conformational changes, we will investigate a set of compounds known as protein structure disruptors. Complex structures and interactions will be investigated with infra-red and Raman spectroscopy.	Jože Grdadolnik	D01/D10
The structural design of catalytic inhibitors of human DNA topoisomerase II α	The aim of the research will be computer-aided design and experimental evaluation of new catalytic inhibitors of the anticancer target, the human DNA topoisomerase II α .	Andrej Perdih	D01/D15



Multiscale simulations of the monoaminergic system	In the framework of research on the monoaminergic system, we will study flavoencime, especially monoamine oxidase A and B, monoamines, conveyors and receptors.	Janez Mavri	D01/D04/D06
The use of machine learning in biomolecular simulations	We will combine methods of machine learning and methods of statistical mechanics for the effective handling of biomolecular systems.	Matej Praprotnik	D01/D11/D12
Development of electrochemical sensors	The development of electrochemical sensors for the detection of traces of heavy metal ions and selected organic analytes is an important segment in the field of sensorics. We recently started developing gas sensors for detecting volatile organic compounds.	Samo Hočevar	D04/D10
Research on atmospheric brown carbon	Brown carbon (BrC) has a strong influence on the absorption properties of the atmosphere and thus on the visibility, the ecosystem and climate change (greenhouse effect). We are mainly interested in its secondary formation and ageing in the atmosphere.	Ana Kroflič	D04/D13
Catalysts for the disposal of organic pollutants from industrial waste water	Organic pollutants are one of the most manageable pollutants in waste water. They can be completely broken down by a catalyst, which is an additional cost for the industry. An efficient, environmentally acceptable and affordable catalyst represents a major research challenge.	Nataša Novak Tušar	D09/D05
Modelling water sorption in MOFs	For the optimisation of materials for heat transformation (stability and density of stored energy), a good understanding of water adsorption is essential. Using simulations, we will search for the most favourable adsorption/binding sites and energy states of materials (MC, DFT).	Gregor Mali	D09/D01
Formation of nanoporous materials for selective gas capture	The efficient and cost-effective separation and capturing of gases from smoke compounds is a major challenge. The potential of MOFs for the selective adsorption of gas molecules (with focus on CO ₂) on the surface of materials at room temperature for further conversion into useful chemicals.	Zabukovec Logar	D09/D07