

School of XFEL and Synchrotron Radiation Users – SFEL 2022

Book of Abstracts

November 6-10, 2022, Liptovský Ján, Slovakia



Jozef BEDNARČÍK (ED.)

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About the SFEL 2022

Pavol Jozef Šafárik University in Košice under the auspices of Ministry of Education, Science, Research and Sport of the Slovak Republic, Ministry of Economy of the Slovak Republic and European X-Ray Free-Electron Laser Facility GmbH in Hamburg organizes School of XFEL and Synchrotron Radiation Users 2022. The school is continuation of the Winter Schools of Synchrotron radiation held in 2011, 2013, 2014 and SFEL 2017, 2018 and 2019.

The aim of the SFEL2022 school is to facilitate the growth of new Slovak research community of high expertise in high-efficiency RTG laser and synchrotron and neutron sources. The SFEL school is designed for efficient transfer of the rapidly developing know-how in these areas to young generation – researchers and university students. The next aim of the SFEL2022 is strengthening of personal connections between the local Slovak research community and forming scientific teams of XFEL users. Slovak research community thus can take advantage of the fact that Slovakia is a shareholder of European XFEL GmbH Company in Hamburg, but also makes more efficient use of other closely related scientific facilities, including ILL and ESRF in Grenoble and DESY in Hamburg.

The SFEL2022 agenda focuses on a more thorough acquaintance with the selected experimental techniques that make use of the XFEL, synchrotron and neutron radiation. Particular attention is devoted to imaging methods for biological and material applications. The School is implemented in the form of invited tutorial lectures (20 – 45 minutes). Young scientists and PhD students are able to present their experiences with FEL, synchrotron and neutron sources via short oral presentations (10 – 15 min) and/or posters. The target group mainly consists of a wider Slovak and international scientific community with an emphasis on young researchers, PhD and undergraduate students. The contents of the School is focused on the interdisciplinary research with emphasis on physics, material science, chemistry, biology, pharmacy, medical science, and IT technology. Organizers allocate time for both oral and poster presentations for students and young researchers (up to age of 35).

Radiation-Induced Method for the Controlled Synthesis of Nanostructured Materials

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The synthesis represents a crucial step for achieving the unique properties of nanomaterials. Gamma (γ) - radiation-induced synthesis possesses several advantages over other conventional synthetic routes such as production of clean materials, the possibility of simultaneous synthesis and sterilization, in-situ generation of radiolysis products and the lack of necessity for initiators and crosslinking reagents in the case of polymer-based materials fabrication. γ -radiation induced synthesis has been utilized in the development and modification of various types of systems, including metal, metal oxide and alloyed nanoparticles, carbon-based nanomaterials, polymer based nanomaterials and nanocomposites etc. In this lecture, fundamentals of radiation chemistry will be given with an emphasis on the synthesis of nanomaterials in aqueous solutions. The effects of the total dose, dose rate, and the addition of different solutes to tailoring the synthesized materials' composition, form, shape, size and size distribution will be demonstrated. The possible applications of so obtained materials in industry and biomedicine will be presented.