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Tuesday, 21th March 2023, 16:00 s.t.

TU Wien, Institut für Angewandte Physik, E134
1040 Wien, Wiedner Hauptstraße 8-10
Yellow Tower „B“, 5th floor, SEM.R. DB gelb 05 B



The seminar will be also held as a Zoom Meeting

<https://tuwien.zoom.us/j/61119276905?pwd=bmINU3dFTWVWVWJpSUtWbGUrZGJrQT09>
Meeting-ID: 611 1927 6905
Passwort: JaPM28h0

Application of energetic ion beams for nanostructuring of crystalline ZnO semiconductor

Zinc oxide (ZnO) is a crystalline semiconductor used in optoelectronics, sensors or as a photocatalyst. Due to its wide direct bandgap, ZnO exhibits only UV light absorption limiting its applications. The nanostructuring of ZnO with noble metals and their nanoparticles can increase the photocatalytic activity of ZnO and enhance visible light absorption, which would extend ZnO application and improve the effectivity of ZnO-based devices. The energetic ion beams offer an interesting option for material modification. They can be used for doping of solids, defect states tailoring, preparation of metallic nanoparticles (NPs) or for the surface nanostructuring of solid materials. On the other side, ion beam modification is causing damage in implanted materials which makes ion beam modification of crystalline materials challenging. The presentation will cover the general interaction of ion beams with different ZnO crystallographic orientations focusing on the damage accumulation in ZnO structure and the ability to use ion beams for ZnO nanostructuring with possible modification of optical and photocatalytic properties. The 400 keV Au ion implantation revealed different damage accumulation and thermal stability of created defects in polar and non-polar ZnO crystallographic orientations. Additionally, the Au/Ag NP preparation and modification of the surface morphology were successfully achieved in ZnO with low and high-energy ion beam implantation leading to the enhancement of visible light absorption.

Adela Jagerova is a PhD student from Jan Evangelista Purkyně University (Czech Republic) where she also obtained her Diploma degree in the field of Applied Nanotechnology. During her studies, she joined the group of Tandetron accelerator laboratory at the Nuclear Institute of the Czech Academy of Science. There she prepared her diploma and doctoral thesis under the guidance of prof. Anna Mackova focusing on the nanostructuring of crystalline materials with energetic ion beams and the characterisation of structural changes in modified materials.

All interested colleagues are welcome to this seminar lecture
(45 min. presentation followed by discussion).

Friedrich Aumayr
(LVA-Leiter)

Richard Wilhelm
(Seminar Chair)