

CEIPEX BUT TOPIC 13

Položka / Field	Obsah / Content
CEIPEX RESEARCH TOPIC LEVEL 1	Advanced Materials
CEIPEX RESEARCH TOPIC LEVEL 2	Plasma technologies
NAME OF THE RESEARCH GROUP	Plasma Technologies (RG-2-09)
SUPERVISOR	Prof. Lenka Zajíčková
PROPOSED RESEARCH TOPIC TITLE	Pushing Plasma-Enhanced CVD beyond Its Conformality Limit or Towards Strong Gradients
RESEARCH TOPIC DESCRIPTION	Plasma-enhanced chemical vapor deposition (PECVD) is gaining momentum in many areas, spanning from microelectronics (thin films in integrated circuits and memories) to biomedical applications (surface finishes for biosensors or implants). Higher integration in microelectronics and sensing devices, as well as the complex porous structures of implanted materials, requires greater deposition conformality, enabling uniform coatings on 3D microstructures. PECVD cannot offer as high deposition uniformity as atomic layer deposition (ALD), but understanding the deposition mechanisms and using precursors that produce depositing species with low sticking coefficients can push the process towards high conformality. On the contrary, knowledge of the processes can tune deposition towards defined gradients in film properties, an attractive approach for bottom-up structuring. The project will involve dedicated experiments with well-defined 3D microstructures to obtain information about the sticking coefficient of deposition species and the role of ions, as well as parallel tests of ALD conformality. The experiments will be supported by Monte Carlo or molecular dynamics simulations to elucidate the processes, and the knowledge gained will be used to deposit bioactive films on 3D microporous materials used as scaffolds for artificial tissues.
KEYWORDS	PECVD, organic films, thin film deposition, sticking coefficient, cavities, slits, wells, 3D microporous materials
INTERDISCIPLINARY DIMENSION	Envisaged bioapplications of the optimized coating for the modification of 3D scaffolds require collaboration with biologists for cell cultivation experiments.
WEBPAGE OF THE RESEARCH GROUP	https://www.ceitec.eu/plasma-technologies/rg386/about-us