

CEIPEX BUT TOPIC 12

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
POTENTIAL CO-SUPERVISOR	Dr. Jan Příbyl (MUNI)
PROPOSED RESEARCH TOPIC TITLE	Laser- and Plasma-Assisted Dry Synthesis of Graphitic Micro-Patterns for Bioactive Cell Interfaces
RESEARCH TOPIC DESCRIPTION	Advanced cell culture platforms require precise control over surface topography, chemistry, and electrical conductivity to effectively guide cellular behavior and fate. Traditional microfabrication methods for graphitic architectures often rely on harsh chemical reagents, multi-step lithography, and high thermal budgets, thereby limiting their scalable integration with sensitive biomaterial substrates. The project objective is to demonstrate a green, simple dry synthesis approach that combines plasma-enhanced chemical vapor deposition (PECVD) to fabricate cell-adhesive interfaces with embedded fluorescent nanoparticles for label-free cell imaging, and direct post-deposition laser writing of high-precision graphitic patterns for electrical cell stimulation. The materials and cell-surface interactions will be characterized using spectroscopic and microscopic methods, including XPS, IR, Raman, EPR, AFM, and TEM, with an emphasis on correlative multimodal imaging.
KEYWORDS	PECVD, carbon, graphitic nanoparticles
INTERDISCIPLINARY DIMENSION	The topic assumes close collaboration between materials scientists developing materials for cell cultivation and nanobiotechnology, who need to provide the necessary feedback on cell behavior on the prepared materials.
WEBPAGE OF THE RESEARCH GROUP	https://www.ceitec.eu/plasma-technologies/rg386/about-us