

CEIPEX BUT TOPIC 1

Položka / Field	Obsah / Content
CEIPEX RESEARCH TOPIC LEVEL 1	Advanced Materials
CEIPEX RESEARCH TOPIC LEVEL 2	Advanced ceramic materials, polymers & composites
NAME OF THE RESEARCH GROUP	Advanced Ceramic Materials (RG-2-01)
SUPERVISOR	Prof. Martin Trunec
POTENTIAL CO-SUPERVISOR	Dr. Zdenek Chlup (IPM)
PROPOSED RESEARCH TOPIC TITLE	Development of multimaterial 3D printing using the digital light processing method
RESEARCH TOPIC DESCRIPTION	The proposed research will focus on developing innovative digital light processing (DLP) technology for the additive manufacturing of multi-material ceramic/ceramic and ceramic/metal components. Unlike conventional composites containing a second phase homogeneously dispersed within a matrix, the project will address structurally integrated composites consisting of spatially defined regions made from different materials. Such architectures may combine distinct functional or structural properties within a single component and therefore require precise control of material distribution, interfaces, and compatibility throughout printing and heat treatment. The main scientific objectives will be to develop suitable photocurable material formulations and robust manufacturing strategies for combining dissimilar materials by DLP. Particular attention will be paid to suspension rheology, curing behaviour, printing resolution, interfacial bonding, debinding, and the compatibility of shrinkage and sintering behaviour. The relationships between processing conditions, microstructure, interface quality, and the resulting mechanical or functional properties will be investigated. The developed approach will be demonstrated through prototype components designed in collaboration with research institutions and industrial partners. The project will also contribute to establishing a long-term research platform for technology transfer, providing academic and industrial partners with opportunities for sustainable collaboration and access to advanced multi-material 3D-printing technologies. The candidate should have experience in ceramic processing, including the preparation and characterisation of ceramic suspensions, shaping, debinding, sintering, and microstructural analysis. Previous experience with ceramic additive manufacturing is required, preferably using DLP or another vat-photopolymerisation method. Knowledge of photocurable formulations, rheology, multi-material processing, or ceramic–metal systems would be an additional advantage.
KEYWORDS	additive manufacturing; DLP method; multimaterial printing; thermal treatment; microstructure, electrical and optical properties

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INTERDISCIPLINARY DIMENSION	Expected collaboration with the "Advanced Instrumentation and Methods for Materials Characterisation" group on research into multi-material printed structures
WEBPAGE OF THE RESEARCH GROUP	https://www.ceitec.eu/advanced-ceramic-materials/rg12/about-us