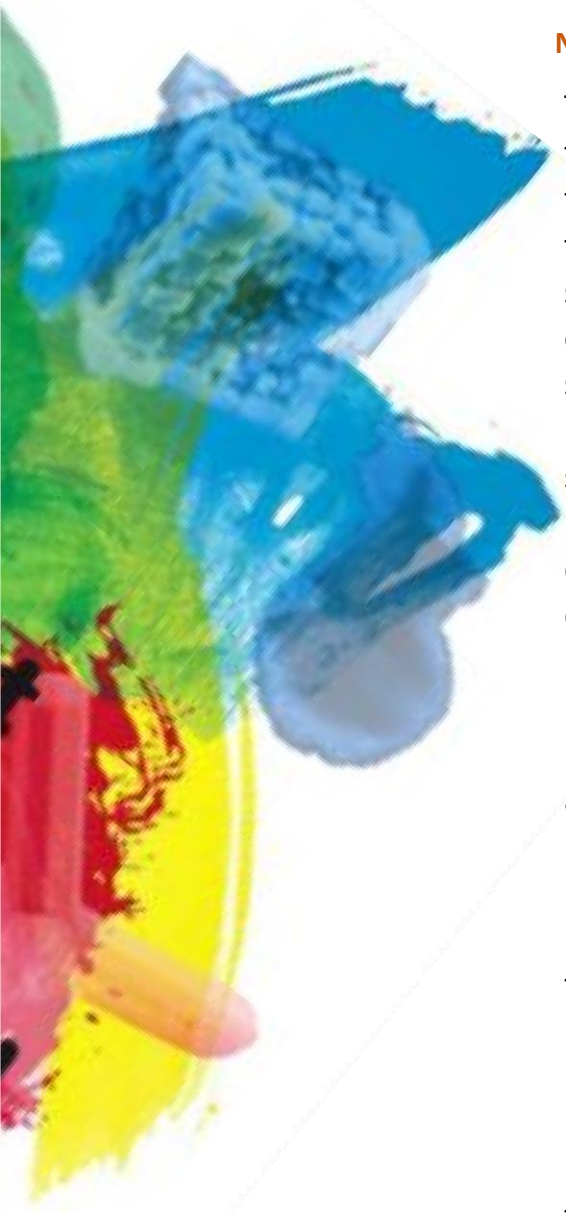
Jožef Stefan Institute
Ljubljana, Slovenia | K7 / Department for
Nanostructured Materials

SEMINAR

Friday, 12.05.2023, 14.00, IPS lecture hall

Rapid sintering of complex-shaped multi-functional ceramic components



Nikhil Bhootpur

The reduction of carbon dioxide emissions resulting from the combustion of fossil fuels is a pressing issue for the future. Hydrogen (H_2) has emerged as a clean alternative that could replace fossil fuels, but its transportation and storage pose significant challenges. Ammonia (NH_3) may offer a solution to these challenges as it can serve as a storage medium for H_2. The Haber-Bosch process can produce NH_3 from H_2, which can be transported and stored more safely and easily than H_2. Additionally, when necessitated, H_2 can be obtained from NH_3 through its decomposition. The decomposition represents a less demanding chemical reaction process compared to its production. However, it needs to be decentralised and more efficient. To accelerate the decomposition reaction by providing both the necessary reaction temperature and suitable catalysts, a self-heatable catalyst framework (SCF) made of porous ceramic housing with a ceramic matrix composite (CMC) internal heatable carbon circuits (HCC) need to be designed. Yet, manufacturing and functionalising of such multimaterial SCFs with complex internal geometries present significant challenges. The present seminar proposes a research study aiming at the processing of multimaterial SCFs based on cellulose-nanofiber-derived oxide ceramic matrices (CMCs) via thermoplastic 3D printing (T3DP) technology and rapid radiation sintering (RS).

Kindly invited.