S9-3 Polymer-Derived Ceramics and Related Materials

SHORT DESCRIPTION:

The Polymer-Derived Ceramics (PDC) route has emerged as an important strategy for preparing functional materials from preceramic polymers. It allows a precise control over the chemical compositions, microstructure and functionality of advanced ceramics and related materials. The latter represent materials made by synergistic combination of organic and inorganic components at the nanometer or molecular level and nanocomposites (defined as either a ceramic nanophase, a carbonaceous nanophase in a ceramic matrix or to encompass a metal as the second component in a ceramic matrix). Additionally, technical fibers, coatings, matrices of composites and functional porous ceramics are examples for the wide field of applications of these preceramic polymers. In comparison to other ceramic manufacturing technologies, the use of polymer-shaping techniques and the low processing temperatures are indeed technological advantages which allow unique properties and functionalities.

This symposium will be the ideal showcase for research activities dedicated to PDC and related materials. Special focus will be given to the relationship between the polymer chemistry (through synthesis and/or chemical modification) and processing conditions, leading to i) various structures at different length scales, ii) complex shapes of materials and to iii) functional materials extensively used in environmental, energy, health and other applications.

SESSION TOPICS:

•Precursor chemistry (synthesis of preceramic polymers, chemical modification, new compositions of preceramic polymers, new methodologies, ...)
•Shaping/Sintering (novel shaping/sintering techniques including 3D printing and ultra-fast sintering methods, ...)
•Characterization at different length scales.
•Multi-scale modelling (from first principle calculations to continuum, including phase field modelling and computational thermodynamics)
•Structural, thermal, optical, magnetic and electrical properties
•Functional materials
•Application in the energy, environment and health fields

ORGANIZERS:

Dr. Samuel Bernard, CNRS, Institute of research for ceramics (IRCER), France
Prof. Ravi Kumar, Indian Institute of Technology Madras (IIT Madras), India
Prof. Gurpreet Singh, Kansas State University, United State
Prof. Zhaoju Yu, Xiamen University, China
Prof. Yuji Iwamoto, Nagoya Institute of Technology (NITech), Japan
Dr. Michaela Wilhelm, Advanced Ceramics Group, University of Bremen, Germany
Prof. Giorgia Franchin, Department of Industrial Engineering, University of Padova, Italy