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Title: Application of ICME principles in the design of structural materials

Organizer	Institution	Contact email
Dr.-Ing. Ulrich Prahl	Steel Institute at RWTH Aachen University, DE	ulrich.prahl@iehk.rwth-aachen.de
Prof. Ernst Kozeschnik	Institute of Materials Science and Technology at TU Wien, AT	ernst.kozeschnik@tuwien.ac.at
Prof. Javier Llorca	IMDEA Materials Institute & Technical University of Madrid, ES	javier.llorca@imdea.org
Prof. Yu Zhong	Department of Mechanical and Materials Engineering at Florida International University, USA	yzhong@fiu.edu

Summary

Integrated Computational Materials Engineering – ICME – is an emerging field in materials science and engineering. The main objective of ICME is the integration of various modeling and simulation approaches, sometimes operating on different length and time scales, into a holistic simulation framework to achieve a comprehensive description of the evolution of materials and engineering components during processing and manufacturing. Application of ICME can substantially shorten product and process development time, while lowering cost and improving outcome. However, linking a variety of models and simulation approaches into one holistic scenario opens important scientific questions, such as, the influence of process parameters or model coefficients on microstructure and properties, the stability of process or simulation chains or the influence of error propagation on the simulation results.

Scope:
The scope of this symposium is to discuss and present novel strategies, especially related to linking different models (material models, process models etc) by either bridging multiple scales and/or multiple process steps along the value chain. The focus is, among others, on developing theoretical, experimentally driven, and computational approaches to material characterization, property prediction, microstructure evolution, etc. They should provide a deeper and better understanding of the processing-microstructure-properties relationship in all kind of materials for structural applications (metallic alloys, composites, hybrids, polymers, ceramics).

Topics to be covered by the symposium:
- ✓ Computer aided design of materials and processes
- ✓ Ab initio driven simulation and prediction of properties and processes
- ✓ Multiscale modeling of mechanical properties and failure behavior of materials
- ✓ Multiscale modeling of microstructure evolution during material processing
- ✓ Local properties prediction towards tailored properties
- ✓ Integrating material models in process models and component design
- ✓ Virtual design, virtual processing and virtual testing of structural materials

		✓ Uncertainty and error propagation in multiscale modeling and generation of design allowable