

LMX Seminar 30 July 2018

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Electroceramics for direct energy converters

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Tailored materials with desired function enable better energy conversion technologies. The lecture will provide a summary on the field of advanced chalcogenides and perovskite-type ceramics gaining importance for a large number of future energy technologies, such as thermoelectric converters, photoelectrochemical cells or batteries.

Their good performance can be explained based on their suitable and tuneable band structure, stability, adjusted charge carrier density and mobility of e.g. strongly correlated electronic systems. These properties can be predicted by theoretical concepts based on a deep basic understanding of the properties to adjust the composition, structure and size of the crystallites in innovative synthesis procedures.

The interest in electroceramics derives from their temperature stability in addition to the advantage of cost-effective non-critical constituents, their tunable transport properties and scalable plasma based synthesis methods.