



IMN-KOLLOQUIUM

Donnerstag, 15. Juni 2023 um 15:00 Uhr im Feynmanbau Raum 115

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New methods for characterization metallic materials employing temperature gradients

Industrial R&D departments and also academic research facilities appear to be more and more pressed for time when working on improvement of existing materials or developing new materials. Computer simulations may be employed to support experimental efforts, but they heavily depend on reliable material data. Similarly, the design of components requires detailed knowledge about material properties. It is evident that the availability of comprehensive data bases accelerates material development efforts. However, for many material classes, data bases are incomplete, contain estimations or extrapolations, or are in the worst case nonexistent.

One of the goals of research in materials science should thus be to provide the necessary data. However, conventional 'data mining' is often tedious, requiring waiting times for thermal equilibrium or steady states to be achieved. The development of high-throughput methods is one of the pathways to larger data bases that contain data on pure substances and also binary and multicomponent alloys. Automated production and evaluation of a series of compositions or thermodynamic states of alloys is certainly a viable way to improve the availability of data.

Highly efficient methods for materials characterization with temperature gradients are at present being developed at FSU Jena. Temperature gradients are, e.g., used to create metastable microstructures that allow the determination of interfacial energies or measure thermal properties such as thermal diffusivity or heat conductivity independent of each other but within one experimental cycle or efficiently analyze materials constitution and help the swift development of thermodynamic databases and new materials. In terms of phase selection and transformation kinetics, the methods with temperature gradients provide details that are out of reach for standard methods.

Vortragssprache: englisch