TEL AVIV UNIVERSITY
אוניברסיטת תל אביב

The Department of Materials Science and Engineering cordially invites you to **The Seidman Family Lecture Series**
In memory of Elie and Jeanne Cohen-Sabban, z"l, Marseille, France, and Charles and Jeanette Seidman, z"l, New York City, New York

Metastability Alloy Design

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Efficient bulk alloy design for high strain hardening and damage tolerance can be achieved by designing matrix metastability in such a way that with increasing mechanical loading, athermal transformation mechanisms are activated, providing additional strain hardening reserves at higher deformation.
Ideally, these additional deformation mechanisms, such as formation of stacking faults, mechanical twinning and martensitic transformations, are not activated at the same load, but subsequently, when the preceding hardening effects are getting exhausted.
When applied to metallic alloys with face centered cubic structure, this approach enables the design of a number of ultrahigh strength steels and high-entropy alloys based on planar slip, mechanical twinning (TWIP steels), and on martensitic transformations (TRIP steels). In these materials, matrix metastability is carefully adjusted through adequate alloying to tune the desired stacking energy.
Recently, this metastability design concept as in steels, high-entropy alloys and beta titanium has also been applied to the activation of athermal transformation effects occurring primarily in confined microstructure regions such as at interfaces and dislocations.
In such cases, local transformation and the associated confined strain hardening equip metallic alloys with enhanced damage tolerance.

Dierk Raabe studied first music and later metallurgy and metal physics at RWTH Aachen. After his doctorate and habilitation he worked at Carnegie Mellon University. His interests lie in three main fields: 1) Design of advanced metallic alloys; 2) Structure-Property simulations of microstructures and mechanical properties of alloys; 3) Advanced and correlative atom probe tomography. Currently he works on the integration of quantum mechanical and micromechanical simulations and correlative atomic probe – electron microscopy observations into engineering materials design and property predictions. The aim is to develop computational materials science from a descriptive into a predictive method enabling identification of new microstructure mechanisms and novel alloys by blending theory, characterization, and processing. In 2004 he received the highest German research award (Leibniz-Award). In 2008 he was awarded the Lee Hsun Lecture Award of the Chinese Academy of Sciences and in 2011 the Weinberg Award of the University of British Columbia. In 2012 he received an ERC advanced grant. He is a member of the National Academy Leopoldina, Professor at RWTH Aachen and Honorary Professor at the Katholieke Universiteit in Leuven.

Tuesday, April 24th, 15:00
Room 134, Wolfson Mechanical Engineering Building