

Inaugural lecture by Grethe Winther

Abstract

Challenges in metal plasticity

Mechanical metal forming operations are widely used industrially. Process simulations of the mechanical forming steps can minimise expensive trial-and-error sequences in the design of the production line. Such simulations require models for accurate prediction of metal plasticity, i.e. the behaviour of the metal during forming. Construction of these constitutes a major challenge as the properties of metals continuously change during processing. These changes are associated with microstructural changes in the metal at multiple length scales. To obtain the necessary understanding of the microstructural processes governing metal plasticity and construct accurate models, experimental data and simulations at several length scales must be coupled.