

**MM 35: Invited Talk (Hauptvortrag) Spatschek**

Time: Wednesday 9:30–10:00

Location: BAR 205

**Invited Talk**

MM 35.1 Wed 9:30 BAR 205

**From grain boundary premelting to liquid metal embrittlement: A modelling perspective** — ●ROBERT SPATSCHEK — Max-Planck Institut für Eisenforschung, Düsseldorf

The embrittlement of a polycrystalline ductile metal by the attack of a lower melting point metal is a long-standing problem for many industrial applications, and it has often led to disastrous material failure. Despite significant progress in understanding, the complexity of mechanisms involved and their interplay make a profound comprehension of this effect very challenging.

In this talk I will focus on a specific aspect of the embrittlement process, which is related to the phenomenon of grain boundary premelting. It allows for the formation of thin liquid films at grain boundaries al-

ready below the bulk melting point, which therefore facilitates fast transport of alloying components in a polycrystalline material with simultaneous reduction of strength. Recent developments of amplitude equations models allow to address this phenomenon from a theoretical and modelling perspective, linking continuum aspects of phase formation with the atomistic features of grain boundaries. This model allows to explain quantitatively the grain boundary premelting transition in terms of a short ranged interaction between adjacent solid-melt interfaces.

Beyond the analysis of nanoscale equilibria, also the kinetics of the grain boundary wetting process will be discussed, using a new Green's function based description. We find that the short ranged interactions strongly influence the wetting kinetics in the diffusion-limited regime.