MM 45: Invited talk Kargl

Time: Wednesday 15:00–15:30 Location: BAR 205

Invited Talk MM 45.1 Wed 15:00 BAR 205

Diffusion in liquid metals and alloys — •Florian Kargl — Institut für Materialphysik im Weltraum, Deutsches Zentrum für Luft- und Raumfahrt, Linder Höhe, 51170 Köln, Germany

Chemical and self-diffusion coefficients of liquid metals and alloys are important input parameters for modelling of solidification, they serve as benchmark for refining molecular dynamics simulations, and they are intrinsically interesting for a better understanding of transport-property relations. Standard methods used for measuring diffusion coefficients are in a non-predictable way subject to external perturbations. This leads to a deviation from purely diffusive behaviour. The resulting effective diffusion coefficients can easily differ by up to 100% from their real value. In recent years, the accuracy in the experimental determination of diffusion coefficients was greatly enhanced by employing quasielastic neutron scattering to determine self-diffusion coefficients and by real-time monitoring of the chemical diffusion process employing X-ray radiography. At an uncertainty of less than 10% for the former and of about 20% for the latter, temperature dependencies and relations between different transport coefficients can be compared with theoretical predictions. Here, we show that: i) self-diffusion coefficients follow an Arrhenius-dependence around the melting point; ii) glass forming-systems show deviations from Stokes-Einstein behaviour; iii) the Darken relation has some shortcomings in predicting chemical diffusion coefficients. We finally highlight the importance of accurate values by comparing modelling results with real-time experiments for microstructure evolution.