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dynamics of lqiuid alloys studied by quasielastic neutron scattering

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We investigate mass transport and flow behaviour of liquid alloys, which are key properties for material processing. Quasielastic neutron scattering provides a unique possibility to access the dynamics of the melt on microscopic time and length scales. On the one hand, this allows the precise measurement of self-diffusion coefficients at elevated temperatures without any convective effect. On the other hand, the microscopic structural relaxation time provides hints on the correlation between different dynamical properties of the melt. While in densely packed, glass-forming alloys self-diffusion and melt viscosity are both governed by one dominant relaxation timescale, for more loosely packed Germanium alloys those processes appear to be less correlated. Technically, it is often necessary to process these alloy melts containerlessly in order to avoid contaminations, which simultaneously results in a good signal-to-background ratio. Currently, the use of aerodynamic levitation for metallic samples are being explored, which will extend the processability of different sample systems considerably.

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