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# Heterogeneous dynamics in a Au-Si liquid investigated with quasielastic neutron scattering

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We report on the atomic dynamics in a glass-forming Au81Si19 liquid using quasielastic neutron scattering. At low q-values and high temperatures the self-diffusion of gold is well approximated in the hydrodynamic approach with a simple exponential describing the final decay of the self-correlation function. With increasing q, we observe a systematic stretching of the correlation functions, indicating the existence of dynamical heterogeneities with decreasing observation length scale even at high temperatures in the equilibrium liquid. A dynamic crossover from the hydrodynamic regime to that of heterogeneous dynamics was observed to occur close to the liquidus temperature. There, a pronounced stretching of the correlation functions over the entire investigated q-range is apparent, which suggests the onset of structural arrest. Despite the glass-forming nature of this system, the self-diffusivity obeys an Arrhenius law characteristic of simple liquids, without any apparent signature of a dynamic singularity in the investigated temperature range. This is most likely due to the very fragile nature of this system, in which the microscopic dynamics exhibits characteristics of both simple and glass-forming liquids.

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