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Title:Inelastic X-ray scattering in metallic glasses
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Abstract:The behavior of acoustic modes in solids can yield information on the glass dynamics at different length and frequency scales. Inelastic X-ray scattering (IXS) using Synchrotron radiation allows us to obtain detailed information on the sound speed behavior at different length scales as well as approaching the macroscopic limit. This gives an insight to the microscopic mechanisms responsible for the mechanical properties in the THz frequency domain. IXS also provides a method to investigate the fragility of glass-forming liquids via the non-ergodicity factor of the corresponding glasses. Moreover, some questions arise about how phenomena such as the polyamorphism, observed, e.g. in Ce <inf>55</inf>Al<inf>44</inf> upon application of pressure, affect the mechanical properties of a metallic glass at a microscopic level. In this article we reveal a change in the high frequency response at the mesoscopic length scale with respect to the ultrasounds limit in metallic glasses. We will also review further applications of IXS on Pd and Ce-based metallic glasses to determine elastic constants, changes in sound speed due to polyamorphism and to investigate their fragility. © 2012 Elsevier Ltd.
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