Presentation: POSTER

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Atomic structure of $As_{25}Te_{35}Si_{40}$ glass

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As–Si–Te glasses are transparent in infra-red range and have higher glass transition temperature than most amorphous chalcogenides. Therefore the interest in these glasses is high, especially for high-temperature applications. In this work we study the local atomic structure in amorphous $As_{25}Te_{35}Si_{40}$, which is situated near the composition $As_2Te_4Si_4$ exhibiting one of the highest softening temperatures in the glass domain of the As-Si-Te ternary system.

The neutron diffraction experiments were carried out with the liquid and amorphous materials diffractometer SLAD at NFL, Studsvik. The incident wavelength of neutrons was 1.11 Å. The scattered intensity was measured between 0.4 $Å^{-1}$ and 10.4 $Å^{-1}$. The X-ray diffraction experiments were carried out at the BW5 experimental station at HASYLAB, Hamburg. The energy of the radiation was 125 keV (0.101 Å). Scattered intensities were measured between 0.5 $Å^{-1}$ and 20 $Å^{-1}$. The EXAFS measurements were carried out at the beam lines A1 (As K-edge) and X1 (Te K-edge) of HASYLAB in transmission mode.

The diffraction measurements are modelled simultaneously with EXAFS data by the Reverse Monte Carlo (RMC) simulation technique. Combination of four independent measurements allowed separation of the partial pair correlation functions. The partial interatomic distances and the coordination numbers obtained are analyzed and interpreted.