

Density fluctuations of supercooled liquid Te

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Liquid Te is known to exhibit many thermodynamic anomalies similar to liquid water [1]; density shows maximum slightly above melting temperature ($T_m=450\text{C}$), positive temperature coefficient of sound velocity and "fast sound" phenomena [2]. Thus, a unifying concept is now being constructed to understand these anomalous liquids: The key is liquid-liquid transition (LLT) or corresponding 'second critical point' [3]. The experimental work to prove the concept is still halfway, because the real, which means 1st-order, LLT is located in deep supercooled and high pressure region, where no one can reach to. Recent small-angle x-ray scattering (SAXS) experiment using free electron laser for liquid water indicates that the density fluctuation shows maximum in deep supercooled 'no-man's land' [4], which should be a strong supporting information of the real LLT.

About liquid Te system, we already proved that density fluctuation shows maximum in the middle of LLT for liquid Se-Te mixtures [5] in the previous SAXS experiment at SPring-8/BL04B2, by using imaging plate (scan speed: over 20min / spectrum) as a detector. But we could not get any evidence for pure liquid Te above T_m at that time. Recently a new detector (Perkin Elmer, XRD1621AN3) with much faster scan speed (1min) was introduced to the beamline and we carried out the measurement again by using it. We succeeded to obtain about 20 spectra during supercooling (down to about 310 C) and to observe that density fluctuation shows maximum in the region.

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