



Supplementary Figure 1. Schematic representation of the indentation set-up (not to scale). The indentation set-up is realized with a multi-stage motor stack, which enables precise alignment of the wedge-shaped indenter tip (E) and the sample (D), with six geometric degrees of freedom (x , y , z , χ , φ , θ) relative to the X-ray beam. It includes a servo actuator (A), two hexapods (B1 and B2) and two piezoelectric positioners (C1 and C2). A frame decouples the sample positioning motors (B2, C2) from the indenter tip. A stepwise increase of the load is achieved by moving the glass specimen upwards, against the indenter tip. The applied load P was quantified by means of a capacitive force sensor (F). The maximum applicable load ($P_{\text{Max.}} = 3 \text{ N}$) is limited due to the low load-tolerance of the hexapods and the piezoelectric positioners. The scattering contribution is accumulated in transmission through the whole specimen thickness in z -direction. In order to map the X-ray scattering intensity at different positions below the indenter tip, the whole indentation set-up was displaced relative to the X-ray beam in x - and y -directions. Such a scan is performed via another hexapod or piezoelectric positioner with sub-micrometer precision (C1 and B1).