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In-situ small angle neutron scattering under thermal-mechanical coupled field loading

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The nanoscale microstructures and their evolution under multi-field coupling condition are vital to materials' property and service stability. However, most of the "structure-property" studies were carried out for ex-situ condition, because it is difficult to in-situ investigate the microstructures evolution under complicated fields. Small angle neutron scattering (SANS) has been widely used to probe the nanoscale structures in different materials. Due to the high penetration of neutrons, it is a powerful technique for in-situ experiments with complicated sample environments, such as load frame and furnaces. Based on small angle neutron diffractometer at China Spallation Neutron Sources (CSNS), we build up an in-situ stress-temperature loading equipment. Its maximum load capacity is 10 kN, and the available temperature range is from -70 to 400 °C. In-situ SANS experiments on composites, polymer networks, hydrogels and alloys under thermal-mechanical coupled field loading conditions were carried out by using this equipment. The SANS 2D scattering pattern was found to evolve from isotropic to anisotropic with stress loading, which reveals the morphology and spatial orientation change of the nanoscale aggregation in the specimen.

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Sitzung Einordnung: Mounting Posters, Beer and light Dinner

Track Klassifizierung: Soft Matter