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Combination of dilatometer with neutron scattering

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A Quenching & Deformation Dilatometer is now operational at the Heinz Maier-Leibnitz Zentrum (MLZ). It is customized for running neutron scattering measurements during temperature/deformation treatment of the sample, in particular neutron diffraction (phase, texture, stress/strain) at STRESS-SPEC and neutron small-angle scattering (nanostructure) at SANS-1. The dilatometer offers a simultaneous high-precision measurement of the length changes of bulk samples at all times, also when heating/cooling or deforming the sample, adding an additional measurement quantity that is sensitive to the phase transformations in the sample. The combination of the neutron and dilatometry measurements yields a unique view on the microstructural evolution under thermomechanical treatment. The sample can be inductively heated and gas cooled according to a user-defined linear or exponential cooling rate. The temperature range is currently from room temperature up to 1500℃. The heating rate can be up to 4000℃/s, while specimens can be deformed with deformation rates between 0.01 and 200 mm/s. Depending on user demand, the temperature range can be extended down to -160℃ with an additional furnace configuration. In addition to the dilatometer, we will present also first in-situ neutron scattering experiments.

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