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A Unique Quenching and Deformation Dilatometer for Combined In Situ Neutron Diffraction Analysis of Engineering Materials

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A modified quenching and deformation dilatometer (TA instruments DIL 805A/D/T) is now in operation at the Heinz Maier-Leibnitz Zentrum (MLZ, Germany) neutron center. It is customized for running neutron scattering measurements during the temperature/deformation treatment of the sample, in particular neutron diffraction (phase, texture, and lattice strain) and neutron small angle scattering. The bulk length change of dilatometer specimens is successfully combined with in situ neutron diffraction patterns for analyzing dynamic processes in metallic materials. A detailed introduction to the unique dilatometer is given and examples of recent experiments highlight the use of the added insight provided by combining diffraction and dilatometry.

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