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## Quenching and Deformation Dilatometer for In-Situ Materials' Characterization by Neutron Scattering

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A Quenching and Deformation Dilatometer (TA instruments DIL 805A/D/T) operates at the MLZ for performing in-situ neutron diffraction (phase, texture, stress/strain) at STRESS-SPEC and small-angle neutron scattering (nanostructure) at SANS-1. Imaging applications are under preparation at ANTARES. With this setup, the evolution of the sample length during heating or quenching can be accurately monitored while scattering data are being acquired. Thanks to induction heating and gas cooling very high rates are accessible. Forces up to 20 and 8 kN can be applied in compression and tension, respectively. Besides, special sample holders for powders will soon extend the range of applications.

The combination of the neutron scattering and dilatometry measurements yields a unique view on the microstructural evolution under thermomechanical treatment. In this work, we will present some results of different materials, i.e. high entropy alloy (HEA), light weight TiAl alloy and Cu-Ce<sub>0.8</sub>Gd<sub>0.2</sub>O<sub>2-δ</sub> (CGO) composites. Dilatometry and in-situ diffraction allows an accurate investigation of phase transformations in AlCrFeNiTi HEA. TiAl alloy study will be focused on the bulk texture evolution induced by hot compression performed with the dilatometer. Finally, Cu-CGO cermets were studied as a bulk at the same time as we obtain in-situ high temperature microstructural information on both Cu and CGO phases (diffraction measurements performed at the synchrotron Desy).

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