

In situ Neutron Diffraction of martensitic Ni-Ti Shape Memory Alloys

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Ni-Ti shape memory alloys are used for medical and engineering applications with increasing commercial success. Despite their technological importance, the elastic behaviour of the monoclinic B19' martensite phase remains elusive, because martensite single crystals are not available for mechanical testing. DFT calculations have provided a monoclinic angle of $\gamma \approx 107^\circ$ instead of $\gamma \approx 98.5^\circ$, as we observe experimentally. In the present work we performed in situ neutron diffraction on a B19' Ni-Ti sample applying tensile load. A special load frame was used where the sample and load axis can be rotated in an Eulerian cradle. This technique allows to separate the effects of elastic and inelastic deformation processes.

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