

Enhanced transformation-induced-plasticity in austenitic steel produced by selective laser melting

Tuesday, 29 October 2019 19:10 (50 minutes)

Austenitic stainless steels, such as 304L, exhibit a combination of high strength and ductility and good corrosion resistance and due to their good selective laser melting (SLM) processability, they are ideal candidates for medical applications profiting e.g. from the possibility to manufacture complex geometries. In situ tensile and neutron diffraction tests on the POLDI instrument at the Swiss spallation source, SINQ were undertaken on 304L specimens produced by SLM at Empa, Switzerland. The loading direction was parallel to the build-direction of the specimens. The experimental results indicate high ductility and pronounced strain-induced martensitic transformation, starting at strains higher than 30% engineering strain. The enhanced martensitic transformation is discussed with respect to the crystallographic texture, as revealed by EBSD, and its affinity to martensite formation under uniaxial loading.

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Session Classification: Poster session

Track Classification: Poster