Contribution ID: **105** Type: **Poster**

Elastic constants and deformation mechanisms in titanium alloys determined through diffraction under mechanical load

Tuesday, 21 March 2023 16:00 (2 hours)

In this contribution, we report on neutron and synchrotron diffraction studies under mechanical stress in titanium alloys Ti-64 (near α-alloy), Ti-6246 (α+β alloy), Ti-5553 (near β-alloy) and Ti-38644 (β-alloy) to investigate the deformation mechanisms. In particular, the determination of single-crystalline elastic constants derived from the measured lattice strains in the polycrystalline specimens will be presented. These results have been used further to quantify the load partitioning in the elastic regime between the softer β phase and stiffer α phase. In addition, diffraction data were collected along the entire elastic and plastic regime to determine the evolution of lattice strains, texture and phase compositions [1,2].

References:
[1] A. Heldmann, M. Hoelzel, M. Hofmann, W.M. Gan, W.W. Schmahl, E. Griesshaber, Th. Hansen, N. Schell, W. Petry, J. Appl. Cryst. (2019). 52, 1144–1156.
[2] A. Heldmann, M. Hofmann, M. Hoelzel, J. Appl. Cryst. (2022). 55, 656–662.

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Presenter: HOELZEL, Markus

Session Classification: Poster session TUESDAY

Track Classification: Engineering applications