Title:

Spherical nanoindentation stress-strain curves of primary-α grains in Ti5-2.5, Ti811, Ti64, Ti6242 and Ti6246 alloys

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Abstract

Recently established spherical indentation stress-strain protocols have demonstrated the feasibility of measuring reliably the mechanical responses at different material structure length scales in a broad range of structural alloys. In the present study, we apply these high-throughput protocols on the primary α-phase grains in polycrystalline samples of Ti-5Al-2.5Sn, Ti-8Al-1Mo-1V, Ti-6Al-4V, Ti-6Al-2Sn-4Zr-2Mo and Ti-6Al-2Sn-4Zr-6Mo to aggregate a large experimental dataset that documents systematically the effects of α -phase chemical composition and grain orientation on the measured values of indentation modulus and the indentation yield strength. This dataset is being offered to the materials community in an open repository to allow further analyses of the effect of chemical composition of the α -phase on its single crystal elastic and plastic properties. This study clearly establishes the feasibility and tremendous value of spherical indentation stress-strain protocols for documenting the grain-scale anisotropic mechanical responses of different α -phase compositions in high-throughput assays.

Details of the samples and experimental protocols can be found in the "Mechanical Responses of Primary-α Ti Grains in Polycrystalline Samples: Part I – Measurements of Spherical Indentation Stress-Strain Curves" publication by the same authors.