

**Use of spherical nanoindentation protocols to study the anisotropic mechanical response of
alpha-beta single colonies in Ti-6Al-4V alloy**

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The recently developed spherical nanoindentation stress-strain protocols were employed in this study to investigate systematically the anisotropic elastic and yield response of the α - β single colonies in a Ti-6Al-4V alloy. This was accomplished by indenting colonies with different lattice orientations of the α (measured by electron back-scattered diffraction) in the polycrystalline sample. It is seen that the employed protocols are capable of providing reliable and consistent information on the anisotropy of the colonies in a high-throughput manner, compared to the other approaches being explored in current literature. Furthermore, the responses measured in this study have been compared against similar measurements on differently oriented grains of primary α . It was noted that the α - β colonies exhibit distinctly different elastic and plastic anisotropy compared to the primary α grains. A dip in the indentation yield properties at 45 degrees declination angle is observed, and a lack of anisotropy is observed in the elastic properties.