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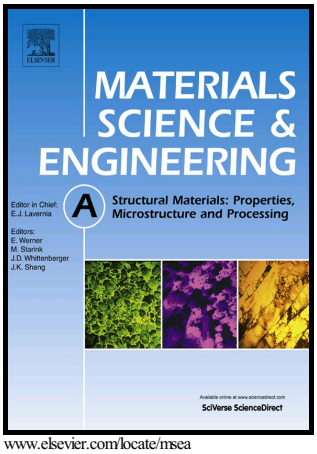

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Abstract

Kink deformation is uncommonly observed in Ti-35V-15Cr-0.3Si-0.1C beta titanium alloy deformed at $5\times10^{3}s^{-1}$. Band structures have formed on the deformed samples. Electron back scattered diffraction analyses prove those band structures are kink bands rather than commonly reported twins in beta alloys with high niobium. The kink bands are classified into three categories since the intragranular misorientation axis analyses reveal that three lattice rotation axes (Taylor axes) exist among the kink bands. The three Taylor axes are $[1\bar{1}0]$, $[5\bar{4}1]$, $[12\bar{1}]$ and the corresponding three slip mode of the dislocation kink model are $(112)[11\bar{1}]$, $(123)[11\bar{1}]$, $(101)[1\bar{1}\bar{1}]$ respectively. It is demonstrated that the selection of the slip mode in a kink bands is dominated by the loading axis. A slip system would have the priority to be selected as the slip mode of the kink deformation if the loading axis is close to the normal direction of the slip plane and the perpendicular direction of the slip direction.

Graphical abstract