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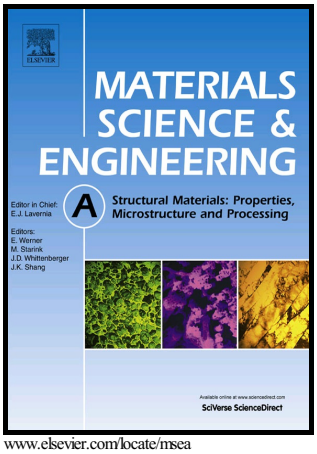

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Dynamic restoration and deformation heterogeneity during hot deformation of a duplex-structure TC21 titanium alloy

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Abstract: The coexistence of equiaxed α, lamellar α and β phase in a duplex-structure α/β titanium alloy not only benefits the balance between strength and ductility, but also arouses a complicated microstructure evolution during hot deformation. The research objective herein is first to investigate the dynamic restoration mechanism, including dynamic recovery (DRC) and dynamic recrystallization (DRX), of both α and β phases during hot deformation of a duplex-structure TC21 titanium alloy. The results show that, after deformation, the geometric morphologies of lamellar α and β phase change more apparently than equiaxed α. Based on the analysis on the distribution and frequency of misorientation angle, it reveals that DRC and continuous DRX (CDRX) occur in all of equiaxed α, lamellar α and β phase, and the increasing deformation temperature restrains the occurrence of CDRX. Synthetically, the correlation between geometric morphology and dynamic restoration is well established. Meanwhile, the heterogeneous degree of DRX indicates a morphology dependent deformation heterogeneity between equiaxed and lamellar α, and between different local regions in β phase which is closely related