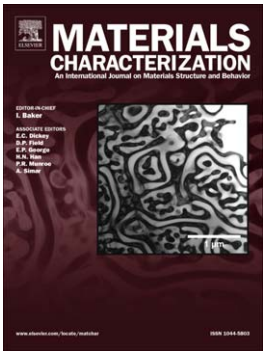

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Nanostructure formation during accumulative roll bonding of commercial purity titanium

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Abstract

In this investigation, commercial purity titanium (CP–Ti) was subjected to accumulative roll bonding (ARB) process up to 8 cycles (equivalent strain of 6.4) at the ambient temperature. Transmission electron microscopy (TEM) and X–ray diffraction line profile analysis (XRDLPA) were utilized to investigate the microstructure and grain size evolution. Both characterization techniques could clarify the non–uniform microstructure in the early stages and the uniform microstructure in the final stages of the process. The effectiveness of ARB for the fabrication of the nano–grained structure in CP–Ti was revealed. It was found that the SFE is not the only factor affecting grain refinement, as compared with other studies on ARB of FCC materials. Influence of other factors such as the melting temperature and the crystalline structure of the material was determined on the grain refinement.

Keywords: Commercial purity titanium; Accumulative roll bonding; Nanostructure; Stacking fault energy

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