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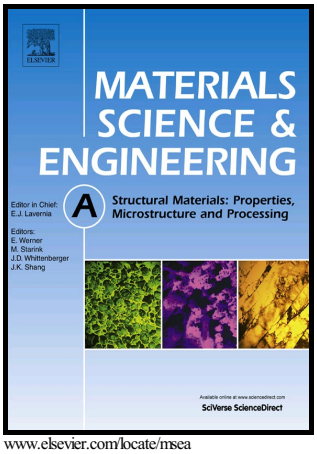

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Effects of direct rolling deformation on the microstructure and tensile properties of the 2.5 vol.% (TiB_w+TiC_p)/Ti composites

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Abstract

In this paper, as cast 2.5 vol.% (TiB_w+TiC_p)/Ti composites were subjected to direct rolling down to 45%, 65% and 85% reduction in thickness in the (α+β) phase region. The microstructure evolution and tensile properties of the composites during direct rolling were investigated. The results show that increasing of the rolling deformation contributes to the refinement of primary α phase (α_p) and the improvement of the distribution uniformity of TiB_w and TiC_p. Furthermore, both the tensile strength and elongation are significantly enhanced with increasing of the rolling deformation. As the rolling reduction reaches 85%, the 2.5vol.% (TiB_w+TiC_p)/Ti composites exhibit an excellent balance of strength and elongation to failure both at RT and 600 ^oC, which is mainly attributed to the microstructure refinement and the load-sharing effect of TiB_w and TiC_p. Fracture analysis shows that the fracture TiB_w and TiC_p followed by the ductile failure of the matrix is the failure