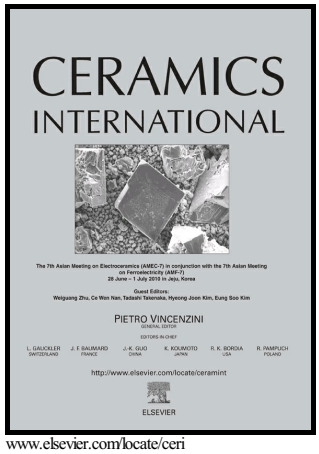

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Comparison of microstructure, toughness, mechanical properties and work hardening of titanium/TiO_2 and titanium/SiC composites manufactured by accumulative roll bonding (ARB) process

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Abstract

In this study, the effects of TiO_2 ceramic nanoparticles and SiC microparticles on the microstructure, mechanical properties and toughness of titanium/TiO_2 nanocomposite and titanium/SiC composite were investigated. To achieve this goal, TiO_2 and SiC ceramic particles were incorporated as the reinforcement in titanium through the ARB (accumulative roll bonding) process. By adding SiC ceramic particles, the mechanical properties of the composite and the nanocomposite were enhanced, while their toughness was decreased, as compared to TiO_2 nanoparticles. After applying 8 cycles of the ARB process, UTS in Ti/5 vol% SiC composite reached to about 1200 (MPa), as compared to that in Ti/0.5 wt% TiO_2 nanocomposite, which was about 1100 (MPa). Furthermore, toughness in the Ti/5 vol.% SiC composite and the Ti/0.5 wt.%