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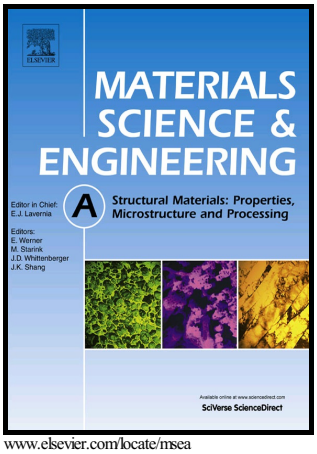

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Abstract

An attempt was made to produce continuous fiber reinforced titanium matrix composites using spark plasma sintering machine from foils and fibers. The materials used were metastable beta titanium alloy Ti-15V-3Cr-3Al-3Sn foils (125 μm thick) and silicon carbide fibers (100 μm in diameter). The method involved consolidating foils with fibers placed in between them at regular intervals. After a series of trials, the feasibility of the process was established. Spark plasma consolidation enabled satisfactory foil bonding and fiber embedment at a significantly lower temperature and time compared to conventional diffusion bonding or vacuum hot pressing. The composite samples consolidated above the beta-transus temperature of the titanium alloy were found to develop satisfactory strengthening precipitation upon direct aging. The current study shows that spark plasma consolidation is an excellent alternative to conventional diffusion bonding for producing continuous fiber reinforced titanium matrix composites.

Keywords: Titanium matrix composite; Spark plasma sintering; Beta-titanium alloy; Silicon carbide fiber