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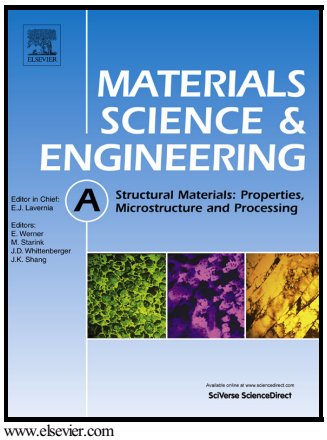

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Investigation of nano-SiC_p effect on microstructure and mechanical properties of Al/TiH_2 foam precursor produced via ARB process

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Abstract

In this study, a new type of hybrid composite which can be potentially used as a foam precursor was achieved by 0.75 TiH_2 and 0.75 nano-SiC_p addition (wt.%) between 5 pure Al strips, followed by 6 accumulative roll bonding (ARB) cycles at room temperature. The effect of nano-SiC particles addition on the resulting microstructures as well as the corresponding mechanical properties of the products was investigated. Al/0.75 wt.% TiH_2 sheets were also fabricated by the ARB process to compare with the hybrid nanocomposite specimens. Scanning electron microscopy (SEM) and related EDS color images revealed that applying 6 ARB cycles led to fairly homogeneous distribution of the TiH_2 and nano-SiC_p and elimination of porosity between the particles and matrix. It was also found that the tensile strength of the Al/TiH_2/nano-SiC hybrid composite was about 1.27 times higher than that of the Al/TiH_2 precursor. SEM observation of fractured surfaces showed that the failure mechanism of the composite and nanocomposite was shear ductile rupture.

Keywords: Al/TiH_2/nano-SiC hybrid composite; accumulative roll bonding; microstructural evolution; mechanical properties