Effect Of Mechanical and Thermal Loading on Boron Carbide Particles Reinforced Al-6061 Alloy

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Abstract

Metal Matrix Composites (MMC) considered as one of the 'advanced materials' has evoked growing interest during the last three decades due to their high performance and applications in strategic sectors. These composites exhibit unique and attractive properties over the monolithic alloys, but suffer from low ductility, which makes them not so attractive for some of the applications where high toughness is one of the design criteria. This limitation of MMCs has been overcome by resorting to various treatments such as mechanical and thermal loading. Considering very limited reports available on Al alloy reinforced with boron carbide (B4C) particles, this paper presents (i) preparation of Al-6061 alloy reinforced with 1.5-10 wt. % B4C, (ii) subjected to mechanical and thermal treatments and (iii) characterization of all the above samples. Specific ultimate tensile strength and hardness of all the composites were higher than those of matrix. Also, these values increased with increasing amount of particles, with composites containing 8 wt. % B4C showing the maximum values in all the three conditions. These observations are supported by the uniform distribution of particles in the matrix as observed in their microstructure.

Keywords:

Metal matrix composite
Boron carbide; Strength
Cold extrusion
Mechanical properties
Morphology