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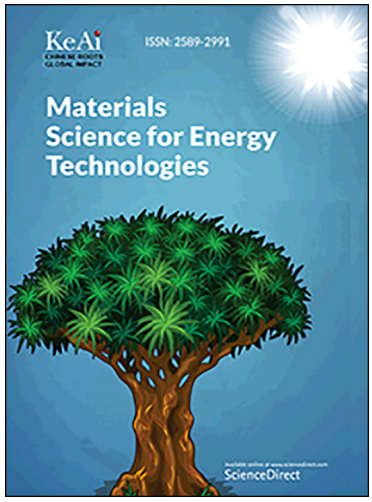

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Electrodeposited Ni/SiC composite coating on graphite for high temperature solar thermal applications

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Abstract

Ni/SiC nanocomposite coatings were electrodeposited on graphite (of different shapes) under galvanostatic condition. The effect of the shape of graphite on the morphological, composition, structural properties of the composite coatings, thermal stability and anti-oxidative behaviour at high temperatures were studied. The major composition of the composite coating is silicon carbide (Si5C3, CSi), nickel silicon (Ni0.92Si0.08) and graphite (C). Porous and fine grain structure is formed with cracks. Uniform distributions of SiC nanoparticle were observed. Circular graphite possessed higher adhesion and thickness of the coatings in comparison with rod and square shaped graphite substrate. Thermal analysis of the coated samples indicates the weight loss of SiC coated graphite as 16.5% (rod), 30% (square), 2.5% (Circular). Uncoated graphite had a weight loss of 32.5%. The thermal oxidation of the coated sample in air is least for circular geometry in comparison to rod and square. Thus SiC coated circular graphite can be utilized for high temperature applications such as solar thermal absorbers.

Keywords: SiC; graphite; high temperature coatings; solar thermal; anti-oxidation; geometry.

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