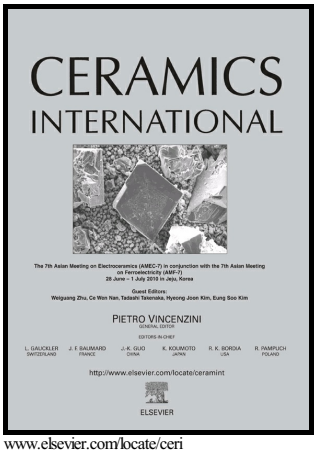

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Strengthened Ti(C, N)-based cermets using high-energy ball-milled NiTiC binders: microstructure and mechanical properties

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Abstract

High-energy ball-milled NiTiC powders were used for preparing Ti(C, N)-based cermets. Effect of NiTiC content on the morphology, composition, interface structure and mechanical properties of cermets were investigated. NiTiC binders promoted the formation of inner rims on Ti(C, N) cores and hindered their coalescence, leading to well-distributed microstructure. Binder had little effect on the composition of rims, but greatly affected the interface structure of core-rim and rim-binder. Complete inner rim could decrease the lattice mismatch between outer rim and core, forming highly coherent interface. With increasing the Ti-C in Ni, the rim-binder boundaries evolved from semi-coherent to coherent interface, due to the decreased lattice mismatch. Small difference in Vickers hardness of cermets was found, with the values ranging from 1622 to 1684 N/mm^2. Bending strength of cermets increased from 1330 to 2073 MPa, with the Ti-C content from 0 to 20 wt%. Further increasing the Ti-C could lead