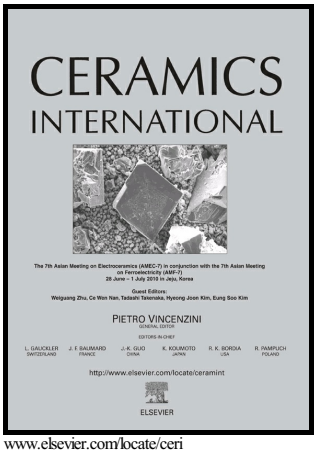

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Scratch behavior of boron nitride nanotube/boron nitride nanoplatelet hybrid reinforced ZrB_2-SiC composites

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Abstract： Spherical instrumented scratch behavior of ZrB_2-SiC composites with and without hybrid boron nitride nanotubes (BNNTs) and boron nitride nanoplatelets (BNNPs) was investigated in this research. Typical brittle fracture such as microcracks both in and beyond the residual groove and grain dislodgement was observed in ZrB_2-SiC composite, while hybrid BN nanofiller reinforced ZrB_2-SiC composite exhibited predominantly ductile deformation. The peculiar three-dimensional hybrid structure in which BNNPs retain their high specific surface area and de-bundled BNNTs extend as tentacles contributes to the improved tolerance to brittle damage. Additionally, easier grain sliding due to BN hybrid nanofillers located at grain boundaries and these BN hybrid nanofillers attached on the scratch surface would provide significant self-lubricating effect to reduce lateral force during scratch and to alleviate contact damage.

Keywords: C. Wear resistance; C. Mechanical properties; D. Borides; B. Nanocomposites; A. Sintering

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