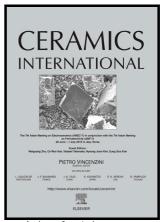
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ACCEPTED MANUSCRIPT

Scratch behavior of boron nitride nanotube/boron nitride nanoplatelet

hybrid reinforced ZrB₂-SiC composites

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Abstract: Spherical instrumented scratch behavior of ZrB₂-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

ZrB₂-SiC composite, while hybrid BN nanofiller reinforced ZrB₂-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;

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B. Nanocomposites; A. Sintering

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