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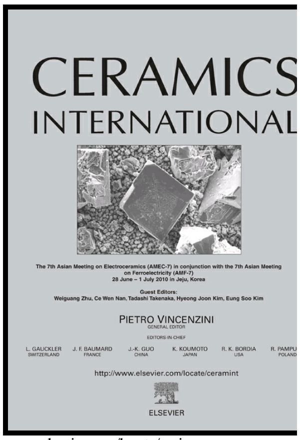

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Effect of graphene and CNFs addition on the mechanical and electrical properties of dense alumina-toughened zirconia composites

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ABSTRACT

Fully dense carbon/alumina-toughened zirconia composites were prepared by using a combination of aqueous colloidal powder processing and spark plasma sintering technique (SPS). Various carbon elements were introduced in alumina-toughened zirconia matrix (ZA) as filler; carbon nanofibers (CNFs) and graphene oxide (GO). The influence of the addition of different carbon forms on the microstructure and on the mechanical and electrical properties was investigated. In the case of the ZAGO composites, the SPS technique allowed, in one-step, the in situ reduction of the graphene oxide during the sintering process. The fracture toughness increases for ZAGO composites in comparison to the ZA material while the hardness decreases slightly with carbon elements addition. The