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Fabrication and Microstructure Characterization of Fibrous Porous SiC-Si_3N_4/AlN composite Using Multi-pass Extrusion process

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A laminated microstructure of fibrous porous SiC-Si3N4/AlN composite was fabricated using multi-pass extrusion process. In the 2nd and 3rd passed samples, the diameter of AlN fibers in the SiC-Si3N4 matrix was found to be 250 μm and 35 μm, respectively. AlN fibers were refined with the increase of extrusion pass number. The mechanical properties of SiC-Si3N4/AlN composite were compared with those of constituent SiC-Si3N4 and AlN layers. The detailed microstructure and phase analysis were investigated using OM, SEM, XRD techniques.

Keywords: Multi-pass extrusion process, SiC-Si3N4/AlN composite, microsturcture, mechanical properties

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IN VITRO MODEL OF BIOACTIVE BI-STRUCTURED CERAMIC-POLYMER NANOHYBRIDS

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Synthetic model of a large crack-free monolithic ceramic-polymer hybrid, which was synthesized using triethoxysilane end-capped poly (tetramethylene oxide) (Si-PTMO) modifed tetra-ethoxysilane (TEOS)-PTMO bulk, was examin-ed in the CaO-SiO_2-PTMO sol-gel system. Bulk precursor with nominal mass ratio of PTMO: TEOS = 80: 20 and surface precursor with nominal molar ratio of TEOS: $Ca(NO_3)_2$ = 1: 0.3 were subjected to hybrid-ization through hydrolysis and condensation process, producing a bi-structured hybrid, in which poly-meric bulk was molecular hybridized with bioactive silicate surface. Spectroscopic and microscopic cha-racterizations revealed that the surface of hybrid was typical bioactive silicate. In vitro study using a simulated body fluid (SBF) revealed that the hybrid formed an osteo-inductive apatite on its surface within only 6 hours, suggesting bioactive materials with high capability of tissue integration as well as polymeric physical properties.

Keywords: bioactive, bi-structured, hybrid