11th Biennial Congress of the Iranian Ceramic Society
The 2nd International Conference on Ceramics

Institute of Ceramics & Glass (ICV-CSIC)

Slurry processing of ceramic nanocomposites reinforced with carbon derivatives

Rodrigo Moreno

Ceramic nanocomposites have received great attention for increasing applications in many different areas. In particular, the use of carbon nanotubes and nanofibers (CNTs and CNFs) or graphenic compounds such as graphene oxide (GO) or graphene nanoplatelets (GNPs) have proven to enhance significantly the mechanical properties and the electrical performance. An essential requirement to achieve the desired properties is to optimize the dispersion of the carbonaceous phase within the ceramic matrix. Colloidal processing emerges as a powerful route to produce monolithic composites as well as coatings and multilaminates. This work reviews the suitability of colloidal processing for the design and fabrication of nanostructured ceramic based composites focusing the stabilization of concentrated slurries and their further shaping into bulk bodies, coatings or laminates. Several examples are given to demonstrate the great possibilities of colloidal processing for the production of nanocomposites with different carbon materials. In the case of structural applications the preparation of alumina–zirconia laminates combining layers with and without graphene oxide or mullite monoliths with CNFs, and the subsequent sintering by non–conventional spark plasma sintering (SPS) technique are described. Examples of the preparation of materials with functional applications are also given, such as the preparation of zirconia-CNFs nanocomposites. Finally, the use of a novel synthesis method such as the use of microwaves assisted hydrolysis for the production of ceramic nanoparticles and core shell nanocoatings with carbon compounds coated with in situ formed nanoparticles is also reported.

Iranian Ceramic Society
Iran University of Science and Technology
Dept. of Materials Engineering Narmak,
Tehran, iran
P.O. Box: 16845-111