

Microstructure and mechanical behaviour of multi-phases ceramic composites

F.Gheldane, S.Bouras

Laboratory of Advanced Materials, Department of physics, Badji Mokhtar University, Annaba, Algeria.

Zirconia particles can be added to the matrix to overcome the brittleness inherent in ceramics materials, thereby strengthening the material through tetragonal-monoclinic phase transformation of the zirconia. This work focuses on the study of Crack propagation behaviour of alumina mullite zirconia composites that were obtained by reaction sintering of alumina and zircon. This material is investigated under monotonic and cyclic loading by means SENB bending method. This material show R-curve effects, i.e. an increase in crack growth resistance with increasing crack depth. The morphological study showed that the resistance of the crack propagation is mainly connected to the crack bridging. The value of bridging stress is in good agreement with the literature.

The toughening mechanisms provided by zirconia and mullite inclusions, based not only on the R-curve behaviour but also on the analysis of the fracture surface, are also discussed in this work.