

Alumina/SiC 나노복합재료에서의 잔류 열응력 완화거동에 관한 연구
Thermal Residual Stress Relaxation Behavior of Alumina/SiC Nanocomposites

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Abstract

Plastic deformation was observed by TEM around the intragranular SiC particles in the Al_2O_3 matrix for Al_2O_3/SiC nanocomposite system. The dislocations are generated at selected planes and there is a tendency for the dislocations to form a subgrain boundary structure with low-angle grain boundaries and networks. In this study, dislocation generated in the Al_2O_3 matrix during cooling down from sintering temperatures by the highly localized thermal stresses within and/or around SiC particles caused from the thermal expansion mismatch between Al_2O_3 matrix and SiC particle was observed. In monolithic Al_2O_3 and Al_2O_3/SiC microcomposite system, however, the dislocation formation was not observed compared to Al_2O_3/SiC nanocomposite system. These phenomena is closely related to the plastic relaxation of the elastic stress and strain energy associated with both thermal misfitting inclusions and creep behaviors. The plastic relaxation behavior was explained by combination of yield stress and internal stress.