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Fatigue behavior of Al_2O_3 -based composite with BaTiO_3 piezoelectric phase

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Abstract

Fatigue behavior of Al_2O_3 -based composite with BaTiO_3 piezoelectric phase was studied by carrying out four-point bending fatigue tests for the poled and unpoled composites, which was compared to that of monolithic Al_2O_3 . Tests were conducted under load ratio of $R = 0.1$ at frequency of 20 Hz with sinusoidal waveform. The present composites exhibited high fatigue resistance compared to monolithic Al_2O_3 . From the detailed observations, it was found that the improvement of fatigue strength was mainly due to stress-induced domain switching. The relationship between da/dN and K_{\max} was evaluated by conducting fatigue crack growth tests. The threshold stress intensity factors for unpoled and poled composites were higher than that of monolithic Al_2O_3 .

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