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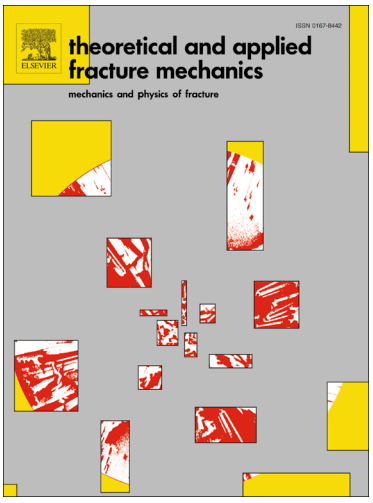

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Mixed-mode fracture of synthesized nanocrystalline forsterite for biomedical applications

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Abstract

Nanocrystalline forsterite is an important biocompatible, nanostructured bioceramic. Various studies have examined essential properties of this biomaterial, including bioactivity, biocompatibility, typical mechanical features, etc. In this research nanocrystalline forsterite powder was produced by the sol-gel method and was characterized via XRD and SEM analysis. By pressurizing the nanopowder under 200MPa and sintering at 1500^{o}C, semi-circular bending (SCB) samples were prepared with cracks of different angles. Fracture tests were then performed under mode-I, mode-II and mixed-mode loading in order to investigate the fracture resistance of forsterite. The specimens were all failed in a brittle manner. The results, then, were compared with two common mixed-mode fracture models called maximum tangential stress (MTS) and generalized maximum tangential stress (GMTS). The generalized MTS criterion provided very good estimations for the experimental results.