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Radiation shielding property of structural polymer composite: continuous basalt fiber reinforced epoxy matrix composite containing erbium oxide

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Abstract

For protecting human body and equipment against radiation in nuclear power industry, radiation medicine and aerospace exploration, advanced materials possessing good shielding capability, low density and high mechanical strength and modulus are in urgent demand. In this study, radiation protective basalt fiber (BF) reinforced epoxy matrix composite containing erbium oxide (Er_2O_3) particles was fabricated by prepreg-autoclave process, in order to make a novel mechanical/radiation shielding composite. For prepared unidirectional and quasi-isotropic BF/ Er_2O_3 composite laminates, basalt fibers and Er_2O_3 particles distributed uniformly, and no obvious agglomeration of particles and defects were found. NaI(Tl) detector was used to test mass attenuation coefficient for evaluating X and gamma rays shielding performance at different photon energies ranging from 31 keV to 662 keV. The experimental results indicate that BF/ Er_2O_3 composite shows good X and gamma rays shielding performance,

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