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Advances in Emerging Radiation Shielding Materials: Synthesis, Properties and Applications

Guest Editor:

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Deadline for manuscript submissions:
closed (10 October 2022)

Message from the Guest Editor

Dear Colleagues,

Radiation shielding materials generally have a high atomic number (Z) because the mass attenuation coefficients generally increase as the Z of the absorber increases. The photoelectric interactions are increased in high-Z materials and these yield more pair production interactions for high-energy photons. Because of the high-Z effect, lead has been commonly used as a shielding material in medical radiology departments. However, lead is extremely toxic. In view of this, polymer-matrix composites have been designed to be lead-free, while being lightweight, conformable, cost effective, and potentially capable of significantly attenuating X-rays. Other matrices such as concrete, cementitious materials or tungsten have been developed as lead-free radiation-protection materials in the walls and roofs of hospital rooms, nuclear power stations, and accelerators which house X-ray, γ-ray, or neutron particle production instruments. The design of a shielding material is heavily dependent on factors such as radiation type, the activity of the source, and the dose rate in addition to its ease of fabrication, cost, and weight.

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Message from the Editor-in-Chief

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