Supplementary Information

Surface Modification of Bi_2O_3 and Preparation of Bi_2O_3@Epoxy Resin Composites: Structure, Properties and Application in γ-ray Shielding

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This file contains following Scheme and Figures

Text S1 Test of grafting rate on Bi_2O_3 surface

Take a clean and labeled empty crucible, place it in the oven along with the sample, and dry until a constant weight is achieved. Weigh 0.5 g of dried M-Bi_2O_3 and transfer it into the prepared crucible for subsequent weighing. Subsequently, heat-treat the crucible containing the sample at 700 °C for 1 h. After high-temperature calcination, allow the crucible to cool down to room temperature before reweighing it. Finally, calculate the grafting rate of M-Bi_2O_3 using Eq. (S1).

$$G = \frac{m_1 - m_2}{0.5} \times 100\% \tag{S1}$$

Where G is the grafting rate, %; m_1 is the total mass of the crucible before calcination, g; m_2 is the total weight of the crucible after calcination, g.

Text S2 Settling performance test

Firstly, 10 mL of liquid paraffin was taken and placed in a 15 mL cuvette, 0.1 g of M-Bi2O3 with different modification conditions was added to the cuvette, and the cuvette was ultrasonically dispersed for 10 min after sufficiently oscillating the cuvette, which was then placed in a test-tube rack, and the settling of the M-Bi2O3 was measured at intervals and the settling curves were plotted.

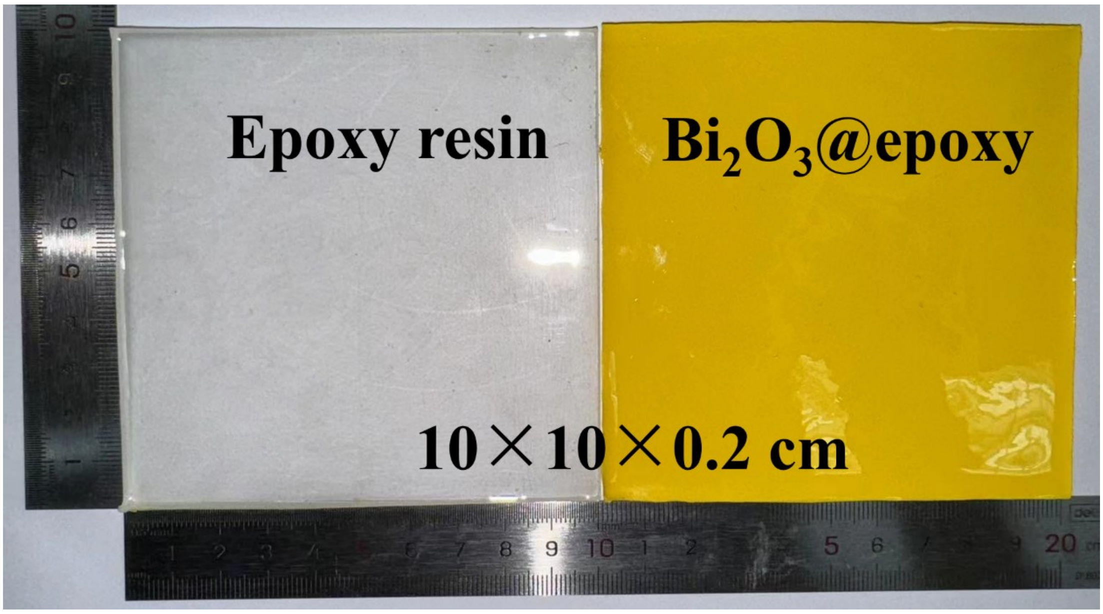

Fig. S1. Photographs of epoxy resin and Bi_2O_3@ epoxy composites prepared by mechanical co-mingling vacuum defoaming process

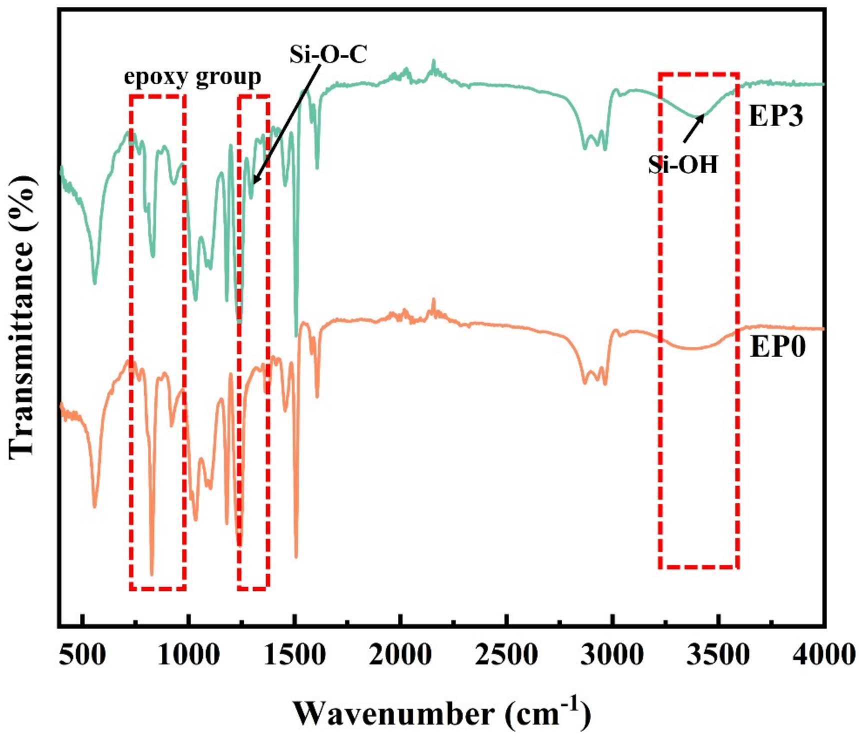

Fig. S2. FT-IR spectra of EP3 and EP0

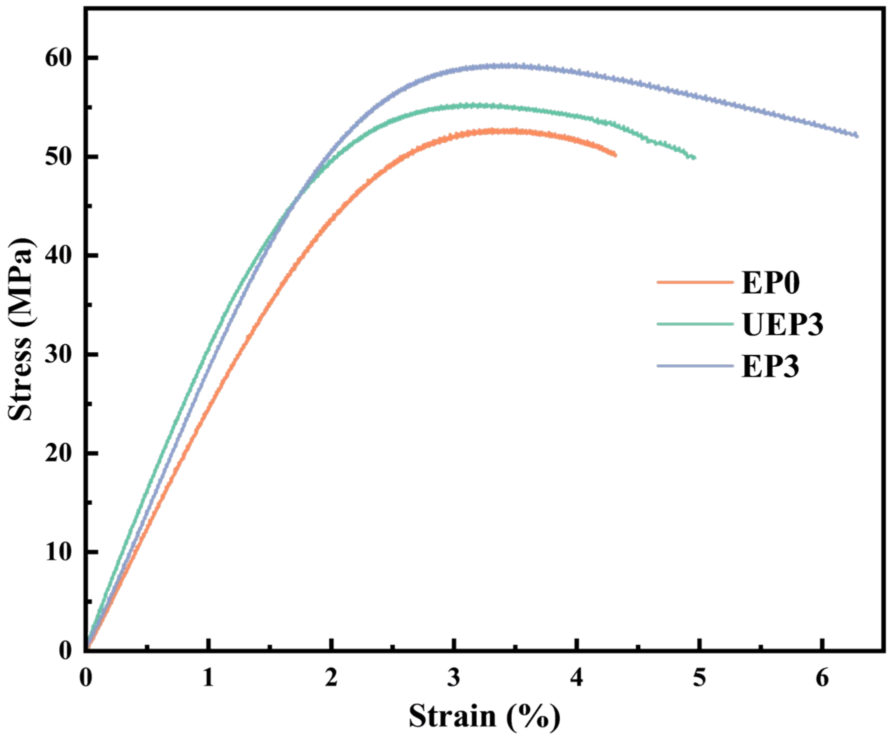

Fig. S3. Tensile properties of EP3 and UEP3

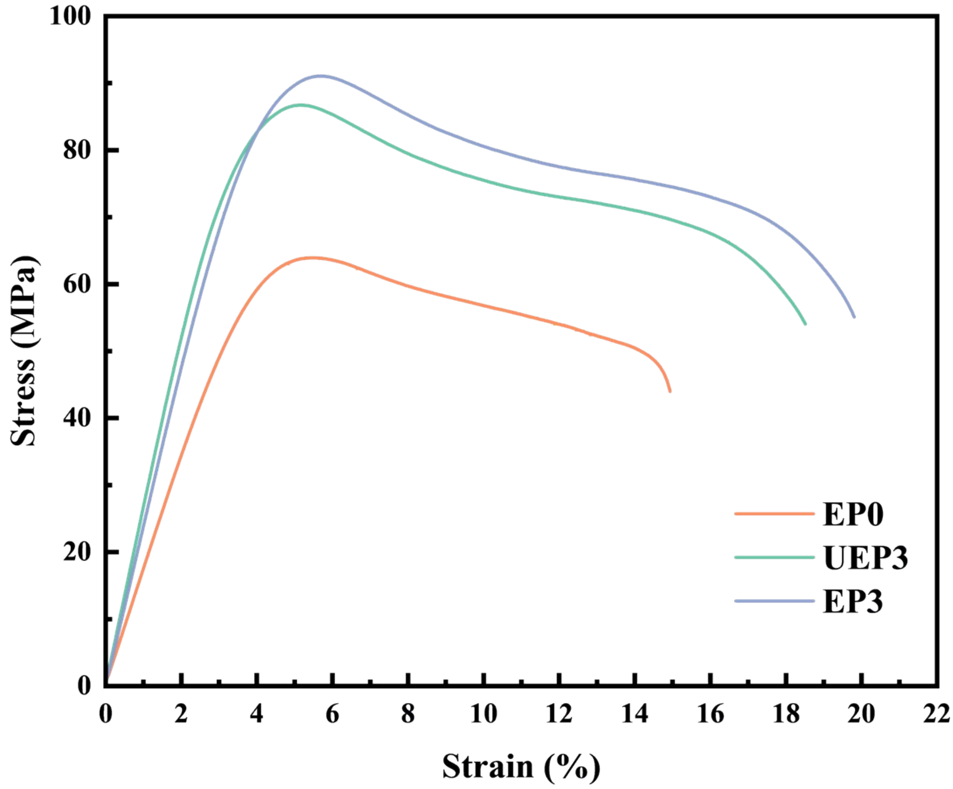

Fig. S4. Bending properties of EP3 and UEP3

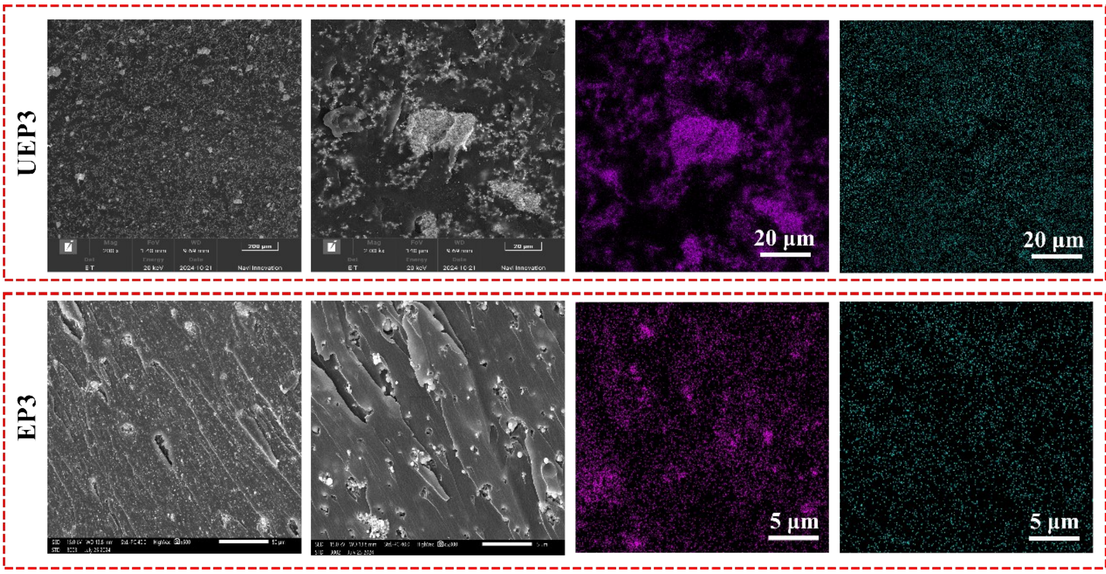

Fig. S5 SEM of tensile sections of EP3 and UEP3

Table S1 Tensile properties of EP3 and UEP3 samples

Samples	Tensile strength / MPa	Elongation at break /%	modulus of elasticity / GPa
EP3（30% M-Bi_2O_3）	57.98	6.29	2.78
UEP3（30% Bi_2O_3）	54.87	4.98	2.81

Table S2 Bending properties of EP3 and UEP3 samples

Samples	bending strength / MPa	modulus of elasticity / GPa
EP3（30% M-Bi_2O_3）	91.03	2.63
UEP3（30% Bi_2O_3）	86.68	2.67