

Multifunctional Performance of Hybrid SrFe₁₂O₁₉/BaTiO₃/Epoxy Resin Nanocomposites

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Supplementary Information

Fitting example for the determination of β -relaxation process by using the Havriliak Negami (HN) Equation (S1):

$$\varepsilon_{HN}^*(\omega) = \varepsilon_{\infty} + \sum_{k=1}^2 \frac{\Delta\varepsilon_k}{[1+(i\omega\tau_{HN,k})^{\alpha_k}]^{\beta_k}} - \left(\frac{\sigma_0}{i\varepsilon_0\omega}\right)^N \quad (S1)$$

where k indicates the studied process, $\Delta\varepsilon_k(T)$ is the relaxation strength, σ_0 is the DC conductivity and N is the exponent which varies according to the conduction process. α and β parameters characterize the width and the symmetry of the loss peak. $\tau_{HN,k}$ is the Havriliak-Negami relaxation time and is related to τ_{max} with the following Equation (S2):

$$\tau_{max} = \tau_{HN} \left[\frac{\sin\left(\frac{\pi\alpha\beta}{2(\beta+1)}\right)}{\sin\left(\frac{\pi\alpha}{2(\beta+1)}\right)} \right]^{1/\alpha} \quad (S2)$$

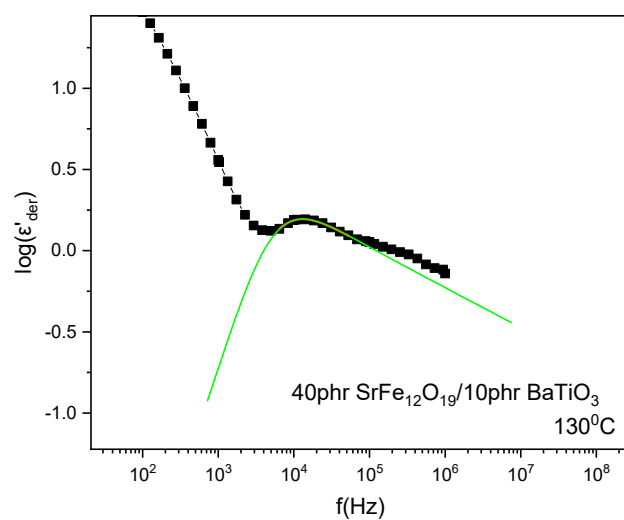


Figure S1. Example of Havriliak-Negami fitting process for β -relaxation for the 40phr $\text{SrFe}_{12}\text{O}_{19}$ /10phr BaTiO_3 /epoxy nanocomposite at 130°C .

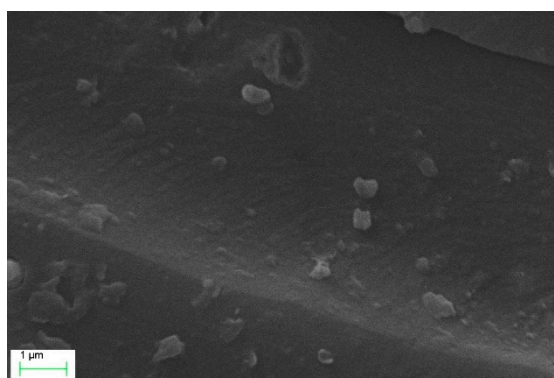


Figure S2. SEM image for the 5phr $\text{SrFe}_{12}\text{O}_{19}$ /10phr BaTiO_3 /epoxy at a lower magnification.

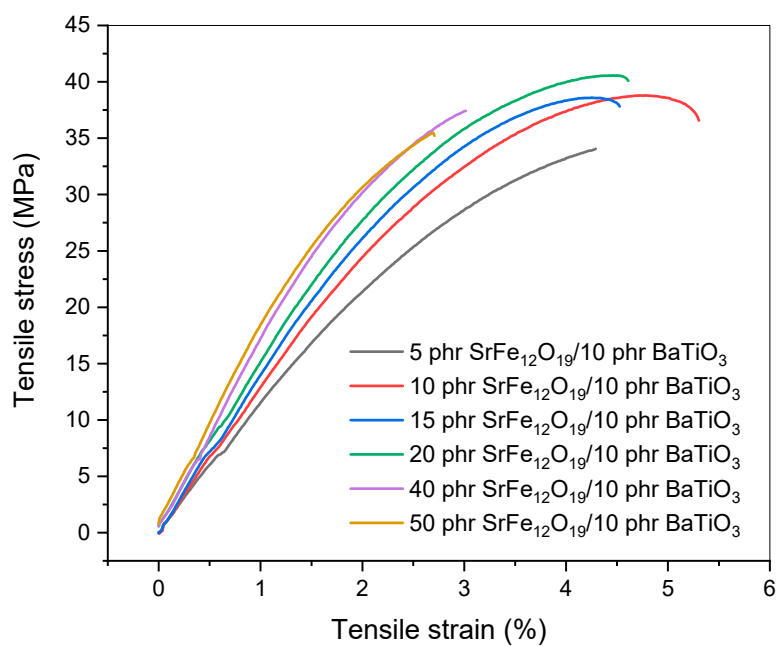


Figure S3. Representative stress-strain curves of all studied systems.

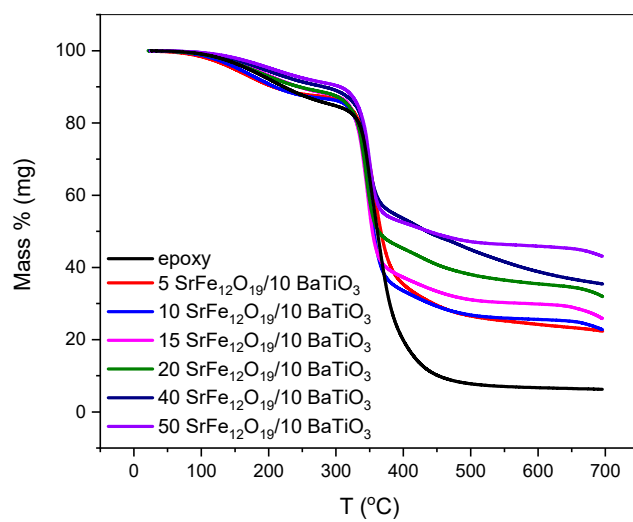


Figure S4. TGA thermographs of all studied systems.

Table S1. Glass transition temperatures determined via DSC, temperatures where the 5% mass loss occurs, and magnetic susceptibility of all studied systems.

Composites	DSC T_g (°C)	TGA T of 5% mass loss (°C)	Magnetic susceptibility χ_m
Epoxy	48.13	169.17	-
5phr SrFe ₁₂ O ₁₉ +10phr BaTiO ₃	48.01	148.59	0.011
10phr SrFe ₁₂ O ₁₉ +10phr BaTiO ₃	51.78	155.50	0.021
15phr SrFe ₁₂ O ₁₉ +10phr BaTiO ₃	48.28	176.20	0.022
20phr SrFe ₁₂ O ₁₉ +10phr BaTiO ₃	47.46	172.40	0.051
40phr SrFe ₁₂ O ₁₉ +10phr BaTiO ₃	48.17	190.64	0.081
50phr SrFe ₁₂ O ₁₉ +10phr BaTiO ₃	47.25	205.07	0.090