

Optimizing High-Density Polyethylene with Nickel Ferrite Micro/Nanoparticles for Superior Magnetic, Mechanical, and Thermal Properties

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1. Characterization of the as-synthesized powder

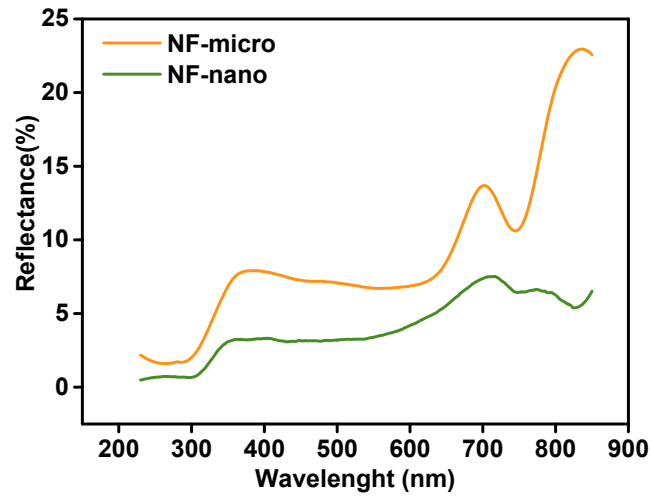


Fig. S1: UV-Visible spectra of NF-micro and NF-nano

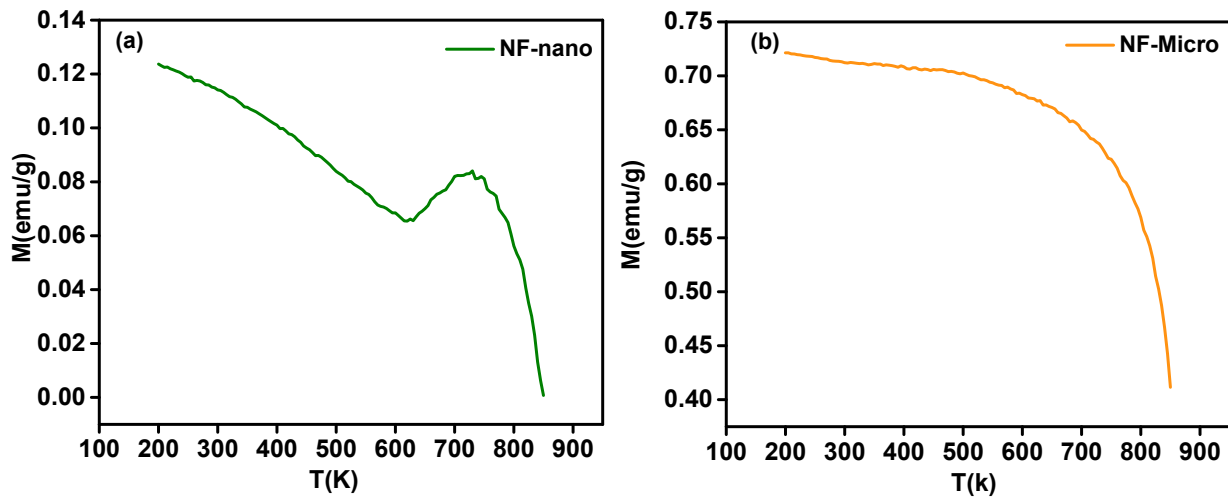


Fig. S2: Magnetization versus temperature curve for the (a) NiFe_2O_4 nano and (b) micro particles

2. Properties of composite materials

2.1 Raman spectra

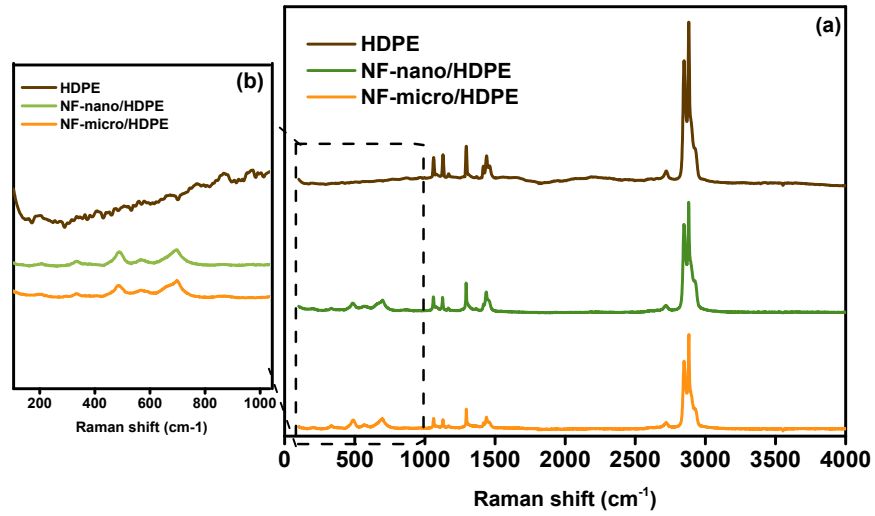


Fig. S3: Raman spectra of neat HDPE, NF-micro/HDPE and NF-nano/HDPE

2.2 UV Visible spectroscopy

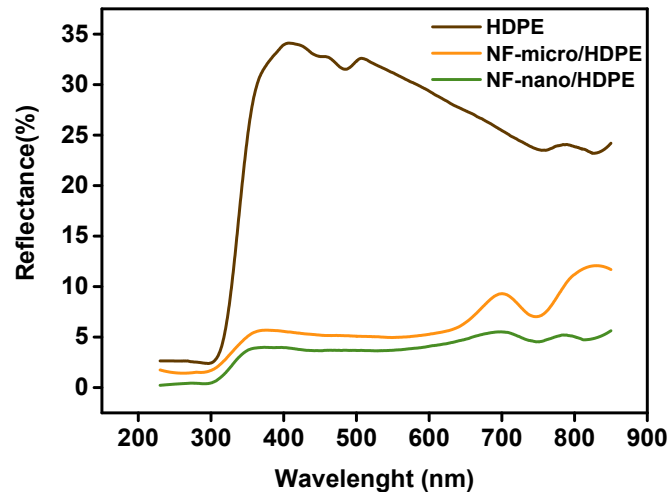


Fig. S4: UV-visible spectra of HDPE, NF-micro/HDPE and NF-nano/HDPE.

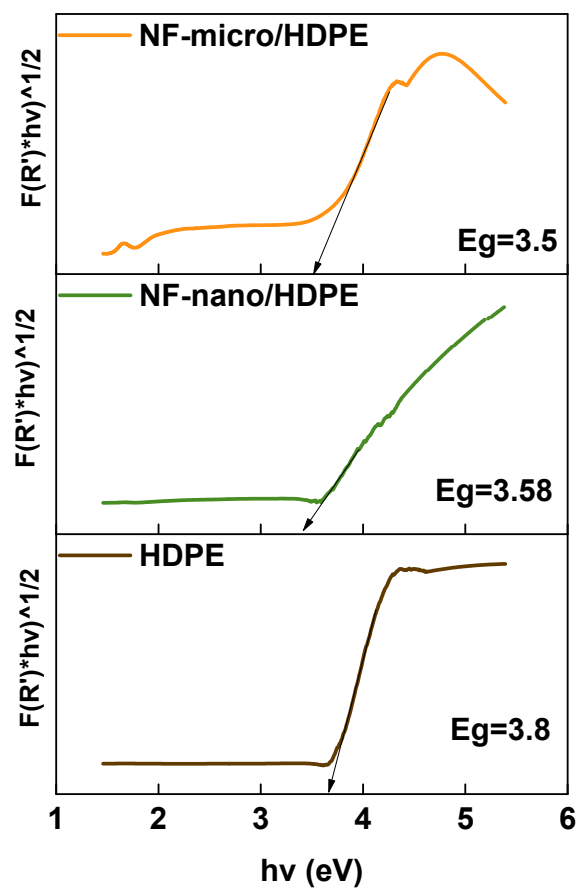


Fig. S5: UV-visible spectra of HDPE, NF-micro/HDPE and NF-nano/HDPE

2.3 Thermal gravimetric analysis

Table S1: Thermal degradation parameters determined by TGA of the neat HDPE and composite materials

Samples	T_{max}	T_{onset}
HDPE	471.11	422.02
NF-nano/HDPE	471.62	426.10
NF-micro/HDPE	460.09	426.83

2.4 Differential Scanning Calorimetry

Table S2: DSC data of neat HDPE and composite materials

Samples	T_c (°C)	ΔH_c (J/g)	T_m (°C)	ΔH_m (J/g)	χ_c (%)
HDPE	117.10	164.16	129.02	161.37	55.15
NF-nano/HDPE	120.63	93.20	130.17	95.62	46.68
NF-micro/HDPE	118.92	113.86	129.75	102.11	49.85