Supplementary Information (SI) for Soft Matter.

Dynamics of poly(methyl acrylate)/poly(methyl methacrylate)-grafted-Fe_3O_4 nanocomposites

Shalin Patil[1], Christopher Mbonu[2], Tsengming Chou[2], Ruhao Li[2], Di Wu[2], Pinar Akcora[2]* and Shiwang Cheng[1]*

[1]Department of Chemical Engineering and Materials Science, Michigan State University, East Lansing, Michigan 48824, United States

[2]Department of Chemical Engineering and Materials Science, Stevens Institute of Technology, Hoboken, New Jersey 07030, United States

**Corresponding author's email: chengsh9@msu.edu (S.C.) and pakcora@stevens.edu (P.A.)*

1. Examine the reproducibility of the measurements

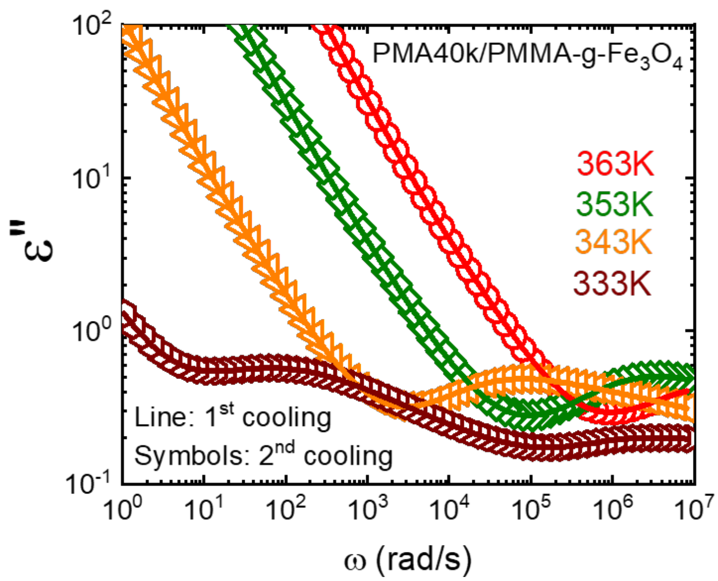

Figure S1. Dielectric loss permittivity $\varepsilon''(\omega)$ for PMA40k/PMMA-g-Fe_3O_4 at 363K (red circles), 353K (olive diamonds), 343K (orange left triangles), 333K (wine hexagons): the lines represent the spectra at first cooling and the symbols represent the spectra at second cooling (symbols). For each comparison, at least two tests have been performed on different specimen.

2. Differential Scanning Calorimetry (DSC)

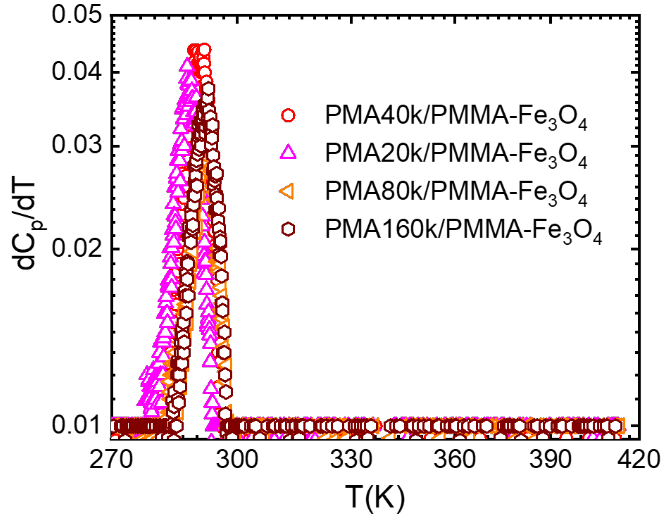

Figure S2. Temperature derivative of the specific heat capacity, dC_p/dT, of the PMA/PMMA-g-Fe_3O_4 nanocomposites. Only one T_g is observed for all nanocomposites.

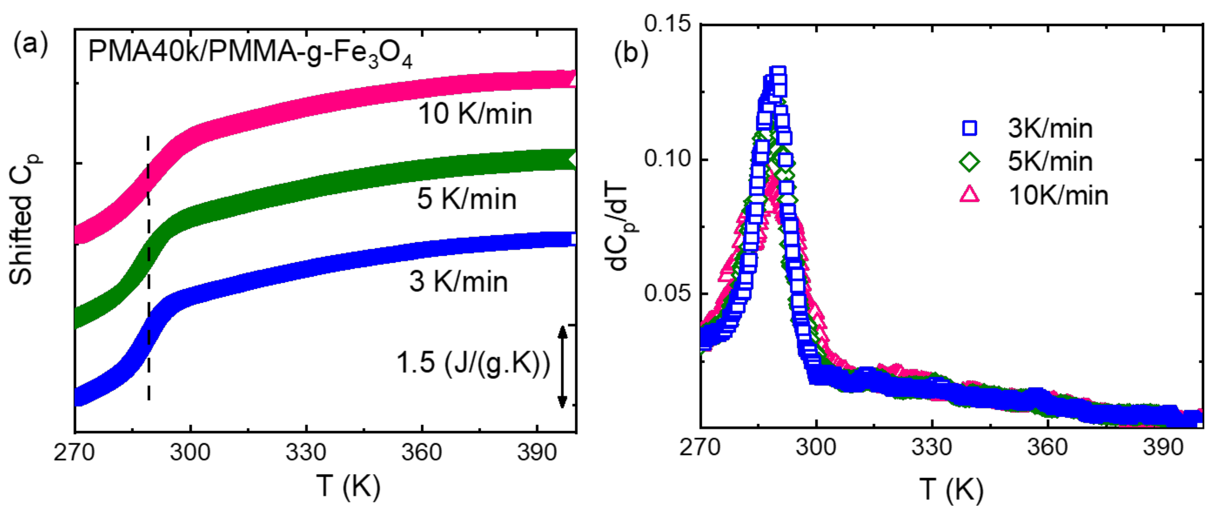

Figure S3. (a) Shifted heat capacity, C_p, and (b) the temperature derivative of the specific heat capacity, dC_p/dT, of PMA40k/PMMA-g-Fe_3O_4 composite at cooling rates of 3K/min (blue squares), 5K/min (olive diamonds), 10K/min (pink upper triangles).

3. Dynamics of PMA/PMMA-g-Fe_3O_4 composites

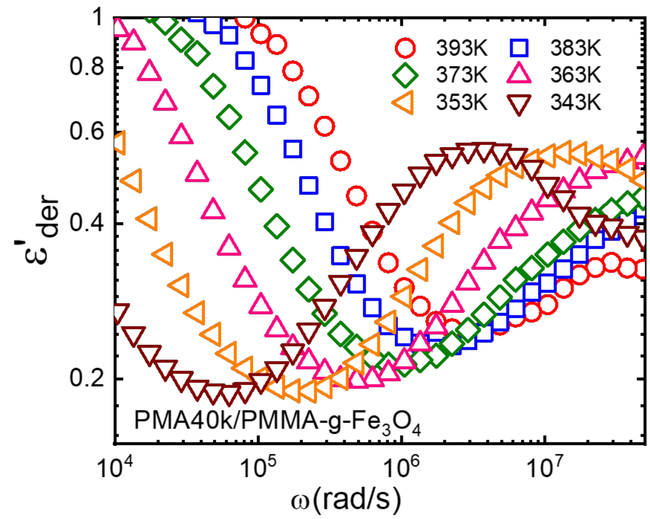

Figure S4. Derivative spectra, ε'_{der}, of PMA40k/PMMA-g-Fe_3O_4 at different temperatures 393K (red circles), 383K (blue squares), 373K (olive diamonds), 363K (pink triangles), 353K (orange left triangles), 343K (wine inverted triangles).

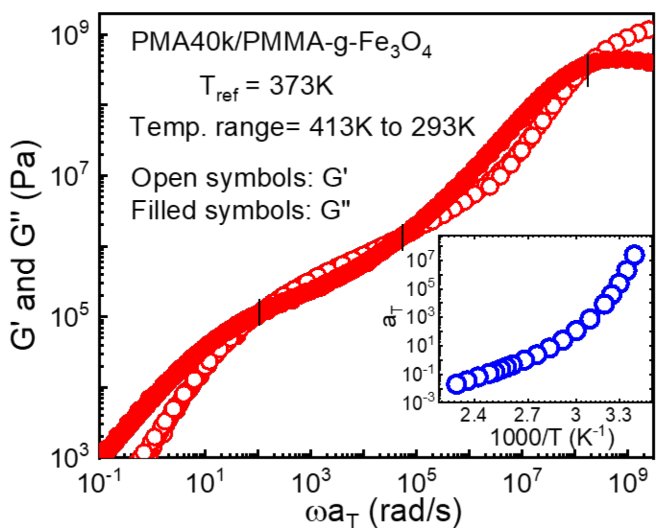

Figure S5. Linear viscoelastic master curve of PMA40k/PMMA-g-Fe_3O_4, G' (open red circles) and G'' (filled red circles), at a reference temperature of 373K. The inset provides the dynamics shift factor, a_T, from the rheological measurements. No vertical shift is needed for the construction of the master cruve. No signs of α relaxation of PMMA can be detected from the rheological measurements

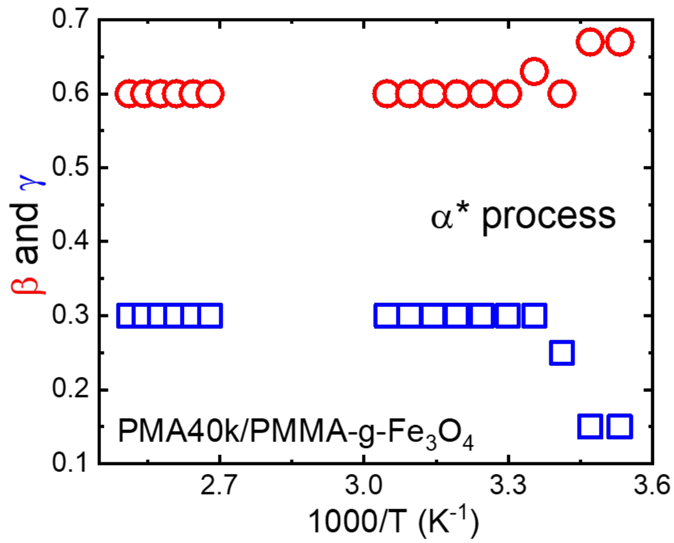

Figure S6. Shape parameters of the α^* process obtained after fittings of the dielectric spectra using the HN function at different temperatures.