Creep Attenuation in Glassy Polymer Nanocomposites with Variable Polymer-Nanoparticle Interactions

Supporting Information

Authors:
C. Francisco Buitrago[†], James F. Pressly[†], Anita S. Yang[‡], Peter A. Gordon[§], Robert A. Riggleman[‡], Bharath Natarajan[*,§], Karen I. Winey[*,†,‡]

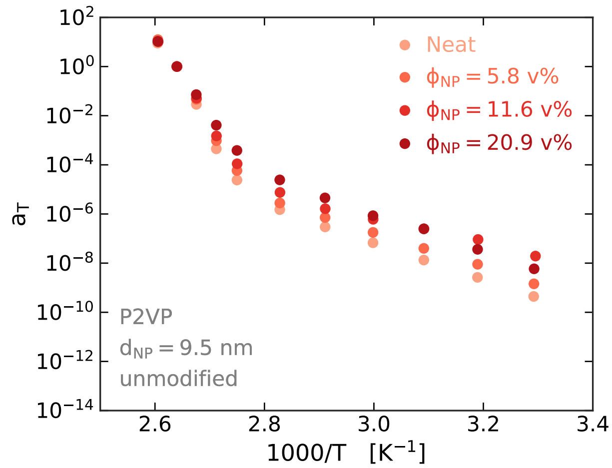
[†]Department of Materials Science & Engineering,
[‡]Department of Chemical & Biomolecular Engineering, University of Pennsylvania, Philadelphia, PA 19104
[§]ExxonMobil Research and Engineering Company, Annandale, NJ 08801
[*]Corresponding Author

GPC Results

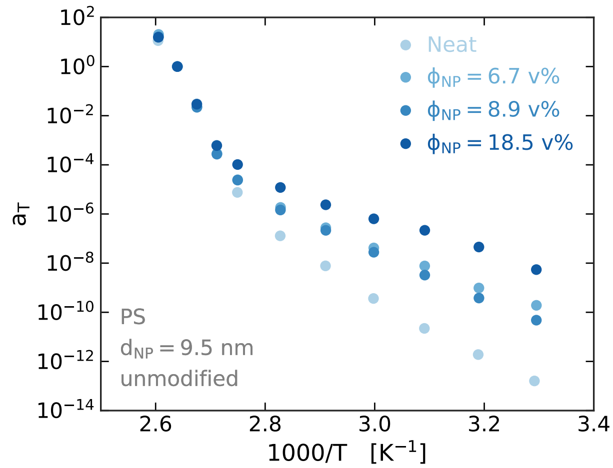
Table S1. Gel Permeation Chromatography Results Illustrating Minimal Effect of Thermal Annealing on Matrix Chemistry.

Polymer	Process	M_n g mol^{-1}	M_w g mol^{-1}	PDI
P2VP	As-cast	70 354	216 902	3.083
	Thermally Annealed	65 734	203 650	3.098
PS	As-cast	69 705	165 115	2.37
	Thermally Annealed	63 124	149 114	2.36

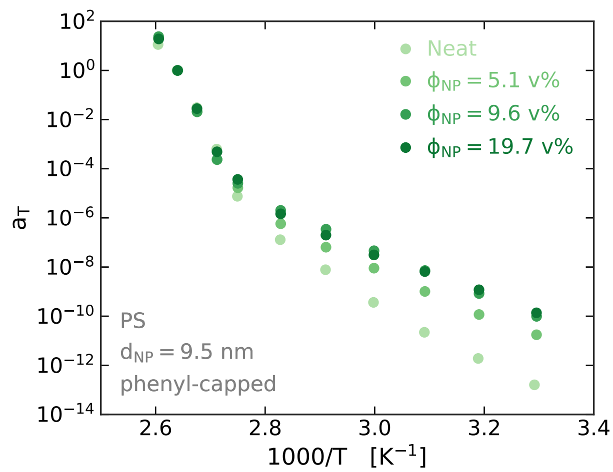
Shift Factors



(a)

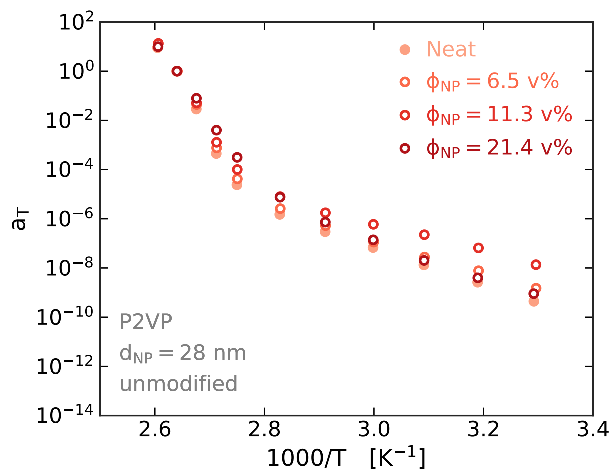


(b)

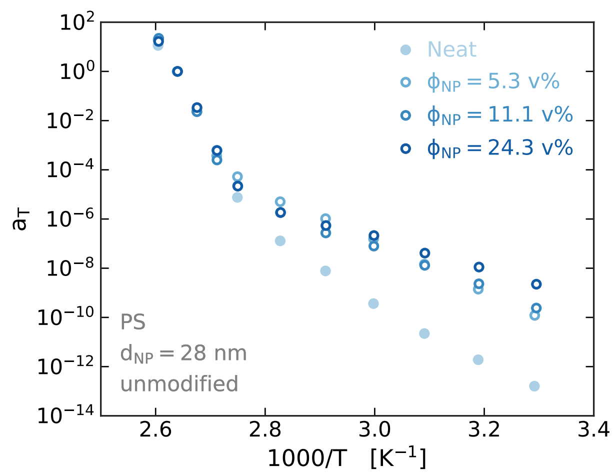


(c)

Figure S1. Shift factors used to create the complex tensile compliance (D^*) master curves shown in Figure 7 (T_{ref} = 105 °C) for various concentrations of unmodified 9.5 nm silica nanoparticles in (a) P2VP and (b) PS and (c) phenyl-capped 9.5 nm particles in PS.



(a)



(b)

Figure S2. Shift factors used to create the complex tensile compliance (D^*) master curves shown in Figure 8 (T_{ref} = 105 °C) for various concentrations of unmodified 28 nm silica nanoparticles in (a) P2VP and (b) PS.

Slope of Secondary Creep Region

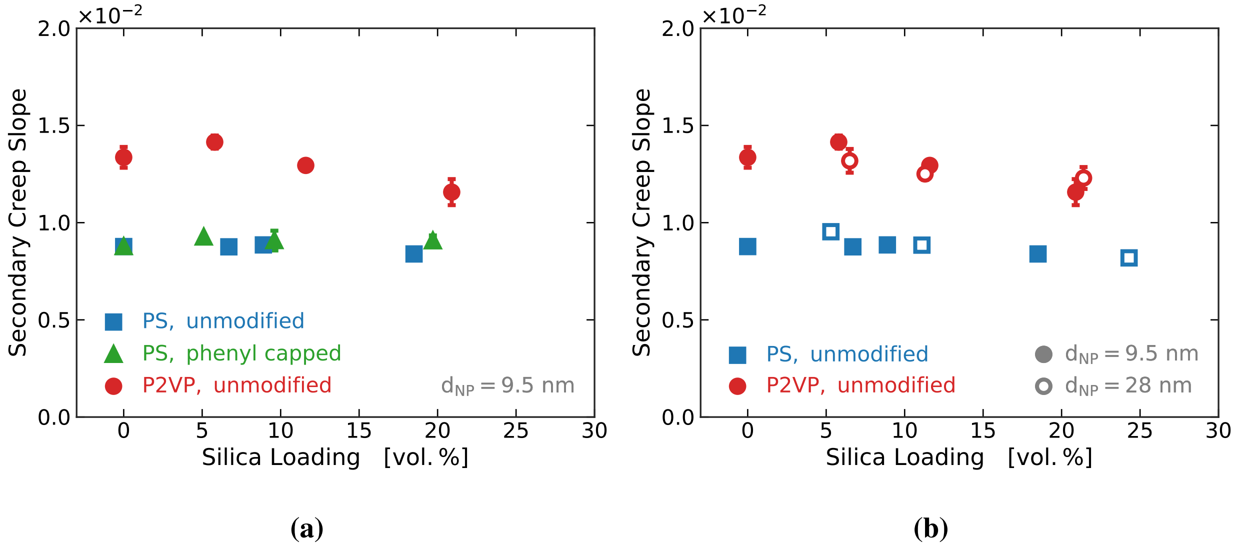


Figure S3. Slope of secondary/glassy creep region versus nanoparticle loading for (a) unmodified and phenyl-capped 9.5 nm diameter particles and (b) unmodified 9.5 and 28 nm diameter particles. The slopes remain relatively constant with increasing nanoparticle loading.