Electronic Supplementary Information (ESI)

for

Role of Nanoparticle Size and Surface Chemistry on Ion Transport and Nanostructure of Perfluorosulfonic Acid Ionomer Nanocomposites

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Small-Angle Neutron Scattering (SANS)

The full SANS curves for Nafion nanocomposite membranes containing a mass fraction of 5 % SiNPs with various surface chemistries and nominal diameters of 10 nm, 100 nm, 200 nm, and >1 μm are provided in the following figures.

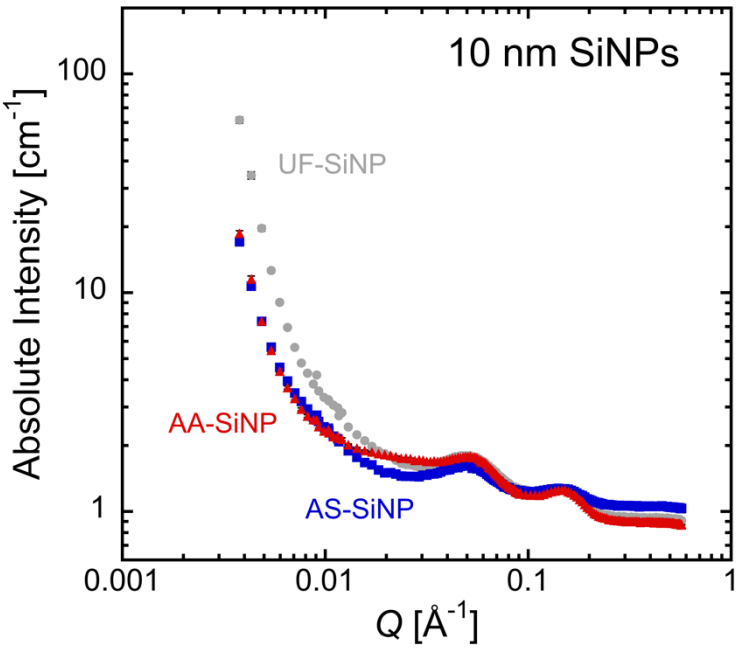

Figure S1. Small-angle neutron scattering (SANS) curves for nanocomposites containing a mass fraction of 5 % SiNPs with various surface functionalities and a nominal diameter of 10 nm. Specifically, the SANS curves for Naf–UF–10, Naf–AA–10, and Naf–AS–10 are shown in gray circles, red triangles, and blue squares, respectively. All membranes were hydrated in 100 % H_2O for at least 24 h prior to SANS experiments. The error bars on the SANS data for each membrane represent the standard deviation in calculated intensities. Note, the scattering data shown in this figure have been previously published.

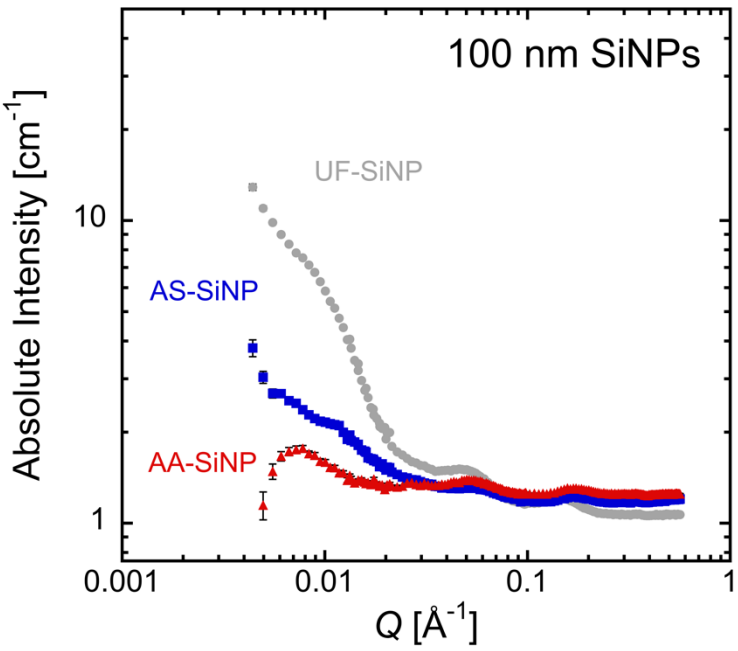

Figure S2. Small-angle neutron scattering (SANS) curves for nanocomposites containing a mass fraction of 5 % SiNPs with various surface functionalities and a nominal diameter of 100 nm. Specifically, the SANS curves for Naf–UF–100, Naf–AA–100, and Naf–AS–100 are shown in gray circles, red triangles, and blue squares, respectively. All membranes were hydrated in 100 % H_2O for at least 24 h prior to SANS experiments. The error bars on the SANS data for each membrane represent the standard deviation in calculated intensities.

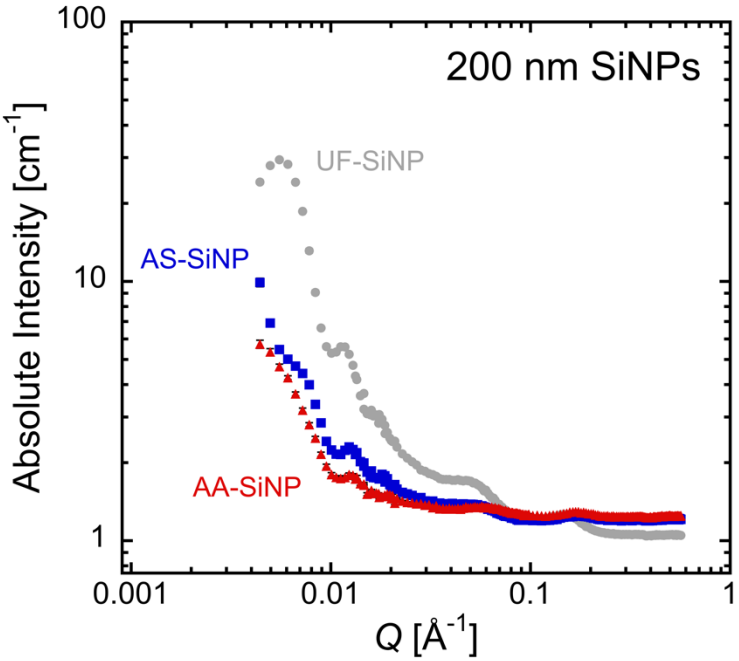

Figure S3. Small-angle neutron scattering (SANS) curves for nanocomposites containing a mass fraction of 5 % SiNPs with various surface functionalities and a nominal diameter of 200 nm. Specifically, the SANS curves for Naf–UF–200, Naf–AA–200, and Naf–AS–200 are shown in gray circles, red triangles, and blue squares, respectively. All membranes were hydrated in 100 % H_2O for at least 24 h prior to SANS experiments. The error bars on the SANS data for each membrane represent the standard deviation in calculated intensities.

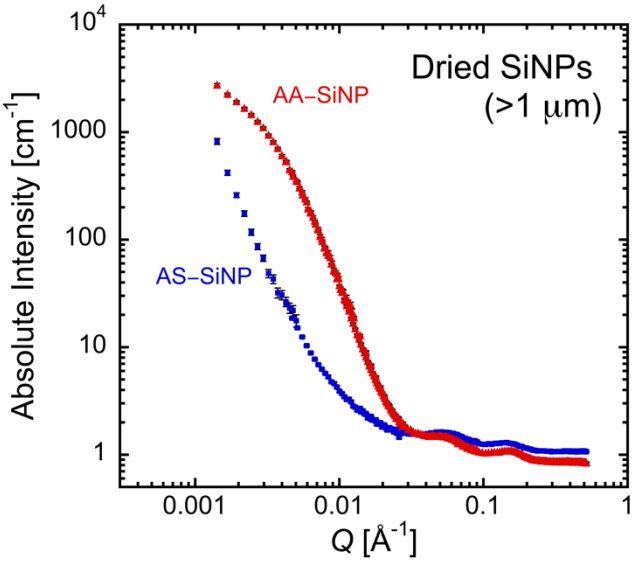

Figure S4. Small-angle neutron scattering (SANS) curves for nanocomposites containing a mass fraction of 5 % SiNPs with various surface functionalities and a nominal diameter of >1 μm. Specifically, the SANS curves for Naf–AA–Dried and Naf–AS–Dried are shown in red triangles and blue squares, respectively. All membranes were hydrated in 100 % H_2O for at least 24 h prior to SANS experiments. The error bars on the SANS data for each membrane represent the standard deviation in calculated intensities.