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Improving the Electrical Conductivity of Polyaniline Through Molecular and Structural Control JOUNG EUN YOO, Princeton University, University of Texas at Austin, KWANG SEOK LEE, University of Texas at Austin, YUEH-LIN LOO, Princeton University — We have investigated the electrical conductivity of polyaniline (PANI) that is template synthesized with a polymer acid of poly(2-acrylamino-2-methyl-1-propanesulfonic acid), PAAMPSA, as a function of the polymer acid molecular characteristics, including its molecular weight and molecular weight distribution. The electrical conductivity of PANI-PAAMPSA increases with decreasing PAAMPSA molecular weight. Additionally, PANI that is doped with narrow molecular weight distribution PAAMPSA is twice as conductive as PANI that is doped with PAAMPSA of comparable molecular weight having a broader molecular weight distribution. We can further increase the electrical conductivity of PANI-PAAMPSA post-synthesis by exposing the polymer film to dichloroacetic acid (DCA). In this case, the conductivity of PANI-PAAMPSA improves by more than two orders of magnitude. UV-vis-NIR spectroscopy and X-ray photoelectron spectroscopy suggest that DCA moderates the ionic interactions between PANI and PAAMPSA, allowing the polymer blend to adopt a structurally more favorable extended chain conformation.

Joung Eun Yoo
Princeton University, University of Texas at Austin

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