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Exploiting redox chemistries to manipulate structure and electrical conductivity in polymer acid-doped polyaniline JACOB TARVER, JOLINE FAN, YUEH-LIN LOO, Department of Chemical and Biological Engineering, Princeton University — Template synthesis of polyaniline on poly(2-acrylamido-2-methyl-1-propanesulfonic acid) yields electrostatically stabilized particles that can be aqueously dispersed and cast into thin films; electrical conductivity in these films scales with inter-particle connectivity. Previous research has shown that solvent annealing with dichloroacetic acid (DCA) induces structural rearrangement of polymer chains and consequently enhances the electrical conductivity by up to two orders of magnitude (from 0.4 to 40 S/cm). Alternatively, the electrostatic interactions between polyaniline and its template can be neutralized through chemical reduction with hydrazine monohydrate, after which the polymer undergoes extensive structural rearrangement; subsequent exposure to nitric oxide leads to reassociation of polyaniline and its polymer acid dopant. Enhanced conductivity is observed following this chemical redox process, and is attributed to extensive polymer chain relaxation and concurrent elimination of the particulate nature of template-synthesized polyaniline.

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