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Structure-property relationships of water-dispersible, conductive PANI-PAMPSA JOUNG EUN YOO, KWANG SEOK LEE, JAMES NORMAN, University of Texas at Austin, MATTHEW ESPE, University of Akron, YUEH-LIN LOO, University of Texas at Austin — Polyaniline (PANI) is an attractive candidate for organic and polymer electronics because of its high electrical conductivity when doped with molecular acids. Its utility as functional components in electrical devices, however, has been severely restricted by processing and patterning limitations because molecular acid-doped PANI does not dissolve in any common solvents. To overcome this barrier, we have investigated polyaniline that is template polymerized in the presence of a polymer acid, poly(2-acrylamino-2-methyl-1-propanesulfonic acid), PAMPSA. In addition to doping polyaniline, the sulfonic acid groups along the polymer acid chain render water- dispersability to PANI-PAMPSA. The doped polymer is therefore not only electrically conductive, it can be easily processed and patterned from an aqueous medium. Solid-State NMR indicates that template polymerization results in linear, defect-free polyaniline. Both X-ray diffraction and electron microscopy experiments on PANI-PAMPSA synthesized at varying PAMPSA molecular weights reveal that PANI-PAMPSA crystallinity increases with decreasing PAMPSA molecular weight. The conductivities of PANI-PAMPSA increase accordingly with crystallinity. These results are corroborated by UV-vis-NIR experiments where the polaron peaks become progressively broader and red-shifted with decreasing PAMPSA molecular weights.

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