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Electrochemical Stability of Polyaniline Beyond pH 9 JACOB TARVER, JOUNG EUN YOO, YUEH-LIN LOO, Department of Chemical Engineering, Princeton University — Conductive polymer films are promising candidates for solution-based biosensor and organic electrochemical transistor devices. For many conducting polymers, however, stable electrochemical activity often demands restrictively acidic solutions. This need has in turn limited the use of conductive polymers in near-neutral and physiological conditions. Using spectroelectrochemical methods, we studied the stability of polyaniline that is template synthesized on poly(2-acrylamido-2-methyl-1-propanesulfonic acid) as a function of pH. Transitions between the different oxidation states of polyaniline are stable and reversible in solutions as high as pH 10. This range of sustained electroactivity far exceeds that of previously reported polyaniline systems. In comparison, polyaniline that is doped with small-molecule acids loses its electroactivity in solutions beyond pH 4. Immobilization of polyaniline within a polymer acid matrix retards dopant diffusivity and reduces proton mobility. The preservation of local acidic conditions within the film greatly extends the pH range of stable electroactivity.

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