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**Biocompatible Ionic Liquid-Derived Conducting Polymers**[1] MILLICENT FIRESTONE, CHRISTOPHER BURNS, SUNGWON LEE, Argonne National Laboratory — A significant and frequently encountered challenge when making an electrical connection to a protein is that its electron-transfer sites are buried within the polypeptide matrix and thus, are not readily accessible to bulk metal electrodes. A further complicating factor is that inorganic (i.e., metallic) electrodes are often incompatible with biological samples. These obstacles might be overcome by the use of conducting oligomers and / or polymers, which are flexible, offering a means to access remote redox centers. These oligomers can be readily modified to include chemical moieties that can connect covalently to sites near redox centers. In addition, conducting polymers can be made to be environmentally responsive (dynamic), processable (conformal coating, soluble) and mechanically durable, thus enabling them to function as an electrical conduit (wire or electrode) to biomolecules. In this work, we describe the design, synthesis and electrochemical properties of thiophene-based ionic liquid monomers and their bulk polymerization by chemical oxidation to yield cationic, aqueous-soluble polymers. Preliminary studies evaluating the electropolymerization of these monomers into nanostructured thin films will also be presented.

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Millicent Firestone
Argonne National Laboratory

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