SYNTHESIS, ELECTROCHEMICAL AND SPECTROSCOPIC STUDIES ON A NEW SERIES OF PYRROLE AND THIOPHENE DERIVATIVES

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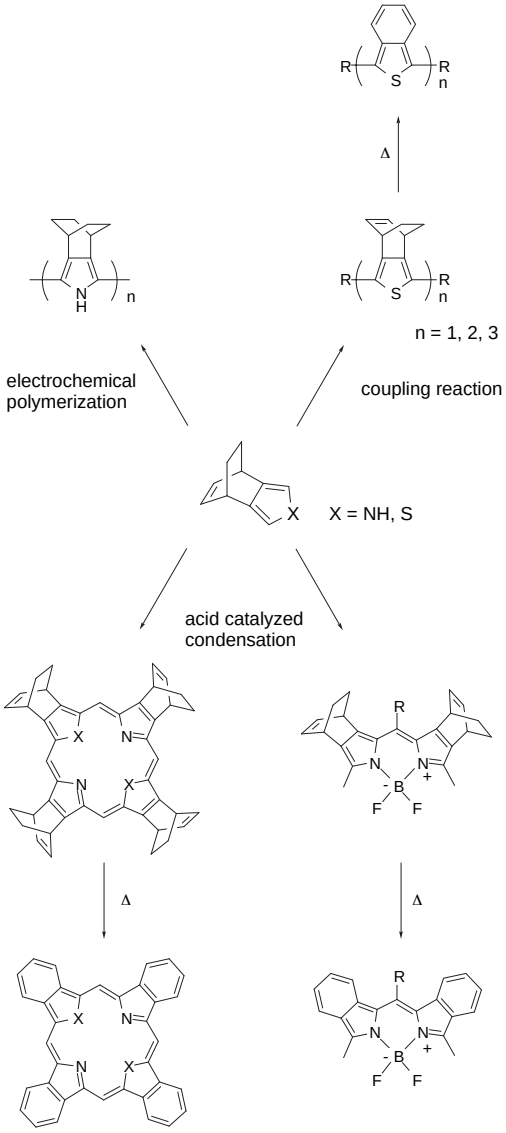
Organic semiconducting materials are currently attracting attention as potential active components in many electronic devices including field-effect transistors, solar cells and light-emitting diodes. In order to improve the electronic and optical properties of such materials, various effective strategies have been made. In this presentation, we describe our new method to prepare various π-conjugated systems from rigid bicyclic rings-fused pyrroles and thiophenes. As the bulky bicyclic rings prevent the intermolecular π,π-stacking, the solubility of these compounds is generally increased. Interestingly, the bicyclic units fix the conformation of polypyrroles to extend the effective conjugation[1] and rigidify the porphyrin ring to maintain planar structure in solution.[2] On the other hand, the pyrrole or thiophene derivatives fused with bicyclo[2.2.2]octadiene (BCOD) units can be utilized as useful synthon of isoindole or isothianaphthene, respectively. They are quite stable and easily converted into corresponding porphyrins,[3] boron dipyrromethene dyes[4] or oligo-thiophenes[5] fused with BCOD rings. Simply heating such derivatives over 200 ˚C, the retro Diels-Alder reaction occurred smoothly to give corresponding more highly conjugated products in quantitative yields. These approaches provide a new strategy for controlling the physical properties of such materials and can be further extended to synthesize novel π-conjugated porphyrins, phtalocyanines, or oligo-isothianaphthenes. The synthesis, optical and electrochemical properties of these compounds will be discussed.



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