

Electrocatalytic and Electrochromic Behavior of the Poly(pyrrole)  
Derivatives with Viologen Pendants

바이올로젠이 달린 폴리피롤 유도체의 전극촉매 및 전기변색 작용

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*N*-methyl-*N*-(6-pyrrol-1-ylhexyl)-4,4-bipyridinium [Py- $V^{2+}$ -Me] dihexafluorophosphate and *N,N*-bis(6-pyrrol-1-ylhexyl)-4,4-bipyridinium[Py- $V^{2+}$ -Py] dihexafluorophosphate were synthesized and oxidatively electropolymerized. These monomers were easily electropolymerizable onto Pt, GC and ITO electrodes forming surface modified electrodes. The polymers showed electrochemical properties of both polypyrrole and viologen moieties. In the CV measurement, the electrochemical redox reactions of  $V^0/V^+$  pair in the monomer(m) and in the polymer(p) were indistinguishable while those of  $V^+/V^{2+}$  pair gave separate peaks. It is interesting to note that there were two reductive pre-peaks(c and b<sub>2</sub>), which has not been explained clearly in the literatures, just beyond the reduction potentials of  $V^{2+}$ (p) and  $V^+$ (p), respectively. Pre-peak c was assigned to the catalytic reduction, via viologen-mediated electron transfer mechanism, of the polypyrrole moieties which were not completely dedoped. Pre-peak b<sub>2</sub> was assigned to the reduction of the  $V^+$ (p) moieties which were produced by the comproportionation reaction between  $V^0$ (p) and  $V^{2+}$ (m) in the vicinity of the electrode surface, indicating the catalytic current. These polymers are good candidates for ECD material showing multichromic behavior. They became pale blue in the fully oxidized  $Py^{a+}$  state and turned violet and yellow at  $V^+$  and  $V^{2+}$  states, respectively.