

PE2(*)

Electrosynthesis of polypyrrole and its composites,

Studies of their properties

폴리피롤과 그의 복합재료의 전기화학적 합성과

그의 물성에 관한 연구

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PPy, PPy/ClO₄, PPy/ClO₄-MnO₂ and PPy/ClO₄.LiMn₂O₄ electrosynthesized in solution 50mM Py without or with dopants. CV, CA, UV-Vis, FTIR, ESR and EIS the methods were used for this study. The coexisting eight kinds of PPy oligomers were found out. It was shown that two kinds of radicals such as carbine radical of 1.5Ex21 spin/gram and nitrine radical of 5.36Ex18 spin/gram exist in PPy. The very intensive one spin packet saturated ESR line suggests that there are different populous packets of carbine radicals. ESR studies also showed coexisting domains of couples of parallel spin and domains of ones of opposite. In combination with UV-Vis results, the CEC mechanism and the origin of spins centers can be clearly explained. A presence of MnO₂, especially LiMn₂O₄, markedly increase the interaction between PPy chains, appear the remarkable hyperfine interaction between radical electron spin and nuclear spin of two nitrogen atoms and observed hyperfine structure with the Mn nuclear spin. EIS studies showed the existence of the two depressed visual semicircles at high frequencies of the Nyquist plots of PPy/ClO₄ and PPy/ClO₄-MnO₂ films, meanwhile theres only one semicircle in the one of PPy/ClO₄.LiMn₂O₄ film. It means that this film acts as a system with one electron exchange. The achieved results give possibility of leading to an initial conclusion that the composite structure of the doped PPy compounds can promote the unpaired electrons to specially excited state (shall become conducting state), in which their wave function overlapping is extended to the entire PPy chain and between chains.