

ELECTRICAL PROPERTIES AND PHOTOVOLTAIC EFFECTS OF POLYANILINE CELLS

박연흠 · 조원 호* · S.Miyata**

성균관대학교 공과대학 섬유공학과

*서울대학교 공과대학 섬유공학과

**동경농공대학 공학부 재료시스템공학과

Polyaniline was prepared by electrochemical oxidation of aniline in aqueous solution containing aniline and sulfuric acid. The aniline films were one micron thick. The film surface exhibited a fibrillar structure with randomly oriented fibrils of diameter 1000–2000 Å. The M/PDP/reduced polyaniline(PA)/Au MIS cells were fabricated by inserting a thin plasma-polymerized poly(N,N'-diphenyl-p-phenylene diamine) (PDP) film between polyaniline and a metal. The Al/PDP/PA/Au cell showed rectifying effect but the Al/PDP/oxidized polyaniline/Au cell showed ohmic behavior. A power conversion efficiency of 0.20 percent, a open-circuit voltage of 0.42 V, a short-circuit current density of 1.9×10^{-7} A/cm², a fill factor of 0.32, and an ideality factor of 3.0 were estimated for Al/PDP/PA/Au cell. An activation energy of 0.13 eV was estimated from the plot of log conductivity versus 1/T. A diffusion potential of 3.37 V, an acceptor density of 2.25×10^{19} /cm³, and a depletion layer width of 130 Å were estimated from the plot of $1/C^2$ versus V. The stability of photovoltaic properties in ambient conditions was improved compared with Au/PA/Au MS cells; the photovoltaic effect disappeared after 6 hours of exposure time in air for Al/PA/Au cell but a rectifying ratio of 55, initially about 99, and a conversion efficiency of 0.07 percent were left even after 17 hours of exposure time for Al/PDP/PA/Au cell.