

On the electropolymerization of acrylonitrile as effected by cyclic voltammetry and chronoamperometry method

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Electropolymerization is now emerging as a branch of electrochemistry that combines the potentiality of that discipline of that and the characteristic features of polymer science.

Mengoli reviewed the potentiality of electropolymerization in polymer coating[1], which is however limited by the long term instability of the polymer/solid substrate interface. In 1988, C. Boiziau and G. Lecayon[2] raised a great prospect by claiming that polyacrylonitrile (PAN) could be grafted onto the usual metals (e.g., Ni) by electropolymerization.

In this work PAN layers were electrochemical deposited on the Cu-electrode by CV and chronoamperometry, respectively: a Pt plate as a counter electrode, Ag | AgCl (sat. KCl-AgCl solution) as a reference electrode, and with AN solution in acetonitrile tetrabutylammonium perchlorate (5×10^{-2} M) as a conducting salt.

The molecular weight and increase weight of PAN were measured according to AN-concentration, scan rate, and cycle number(or time): from 5×10^{-2} to 5 M AN for AN concentration, from 20mV/sto 100mV/s for a scan rate, from 10 to 90 for a cycle number, from 10 to 60 min for time.

Figure 1 shows the device of electropolymerization of AN. Figure 2 confirmed the existence of the two reduction peaks at -1.8 and -2.7 V. The fracture surface of PAN layer performed by CV and chronoamperometry, respectively was observed by SEM image. The mechanism for electropolymerization of AN were discussed.

Reference

- [1] Mengoli, G. *Adv. Polym. Sci.* **1979**, 33, 2
[2] Boiziau, C; Lecayon, G. *La Recherche*, **1998**, 19, 888

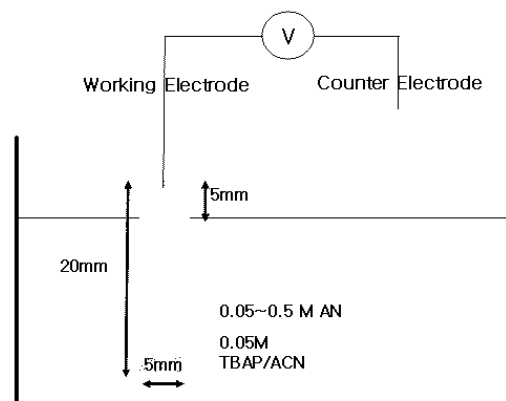


Figure 1. The device of electropolymerization of AN

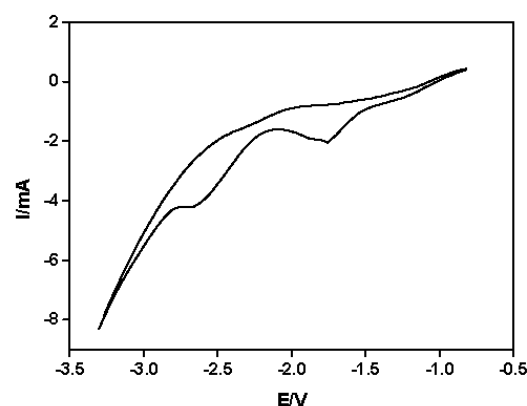


Figure 2. Cyclic voltammetry of AN on Cu-substrate in 0.05 M TBAP solution in ACN. [AN] = 0.05 M ; scan rate = 20mV/s