

The Open Circuit Behaviour of Polyaniline in Acidic Media

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Polyaniline (PANI) is frequently referred to as the most stable material within the class of conducting polymers [1] and accounts for its versatility in many practical devices, however the stability of PANI under open circuit conditions has received very little attention. In this study the variation in the open-circuit potential of PANI films over time is reported. PANI films formed by potential cycling methods in a sulfuric acid solution on platinum electrodes were exposed to a variety of conditions in acidic media and were monitored for their open circuit behaviour over a range of initially applied potentials.

Interesting open circuit potential – time profiles were obtained for PANI films exposed to air equilibrated, de-aerated and oxygen saturated solutions of 1 M H₂SO₄. Fig.1 shows the behaviour of PANI in an air equilibrated 1 M H₂SO₄ and Fig.2 shows the behaviour of PANI in a degassed solution of 1 M H₂SO₄ + 0.25 M Na₂SO₃. The presence of sodium sulfite has the marked effect of shifting the equilibrium potential of PANI from 500 mV in aerated solution to 200 mV in sodium sulfite.

The results are used to explain the behaviour of PANI in sensor devices.

[1] A. Kabumoto, K. Shinozaki, K. Watanabe, N. Nishikawa, Synth. Met., 26, 1988, 349

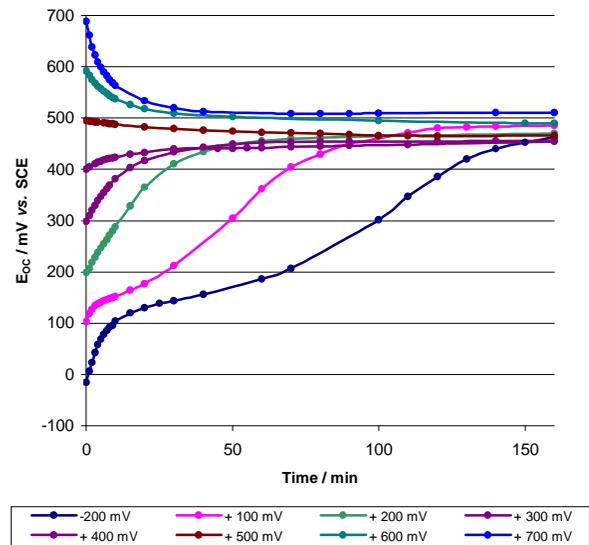


Fig 1. Open circuit behaviour of PANI in an air equilibrated 1 M H₂SO₄ solution.

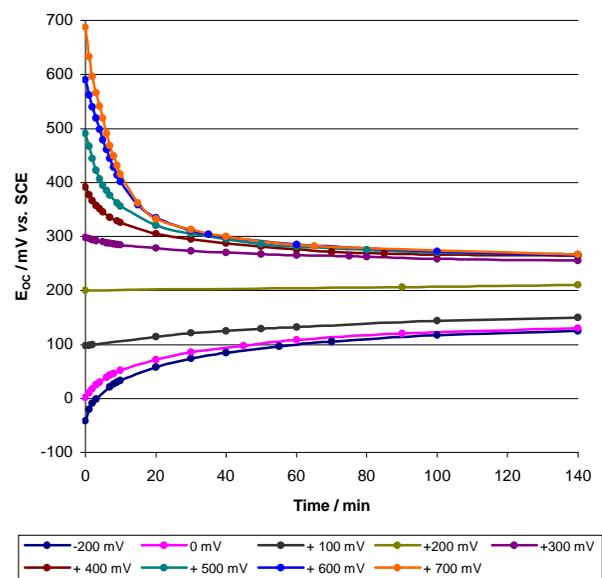


Fig 2. Open circuit behaviour of PANI in Nitrogen purged 1 M H₂SO₄ + 0.25 M Na₂SO₃ solution.

