

#### 4 CONCLUSION

It can be concluded from the present study of polyaniline that the electropolymerization of polyaniline was to a significant extent affected by the concentrations of monomer (aniline), sulphuric acid, added polyelectrolyte, and types of electrode materials as well as temperature of electropolymerization. Increasing the concentration of aniline and sulphuric acid increases the rate of electropolymerization. Incorporation of ortho-anilic acid depresses the electropolymerization process.

Different types of working electrode materials showed different electrocatalytic activity. Platinum was the most electroactive material. Sintered platinised titanium plate was reusable due to the strong adherence of platinum particles on to the titanium surface. Sintered platinised titanium, which is much cheaper than pure platinum, could be used as efficiently as pure platinum plate.

The surface conductivity of Ppy-PSS films was in the range of 1 to 12 S m<sup>-1</sup> and it appeared to be dependent on the thickness of the films (in the range of 5 to 90 μm). The results could imply that, the surface conductivity might involve the transportation of charge through the bulk of the polymer films.

Most of the publications, which reported surface conductivity measurement by the "four-point probe" method, did not mention the details of methodology and calculations. The reliability of "four-point probe" as the method to measure the surface conductivity should be studied thoroughly since this method was originally designed for inorganic semiconductor materials only. Further study on the mechanism of electrical conductivity is necessary.

The relationship between body conductivity of Ppy-PSS film to the pressure applied requires further investigation as this idea may lead to useful applications, for example, an electrical pressure sensor, which conducts differently under different pressure.

Sulphonated polypyrrole (Ppy-PSS) films were found to be useful in copper removal for low copper ion concentrations ( $< 50$  mg/L). Such films were able to remove copper down to below 1 mg/L. The idea may be suitable for other heavy metals removal but further detailed study is needed.