

Fig. 1. Scheme of preparation of Pt/PANI composite: (a) hexachloroplatinic acid solution, (b) phase transferred Pt^{4+} ions, (c) reaction vessel showing the addition of (b), PANi, dodecane thiol and sodium formate, leading to the formation of Pt/PANI.

values were collected by holding the cell at each current density value for 30 s.

2.5. Characterization techniques

XRD study was carried out using Philips Powder diffraction-meter (Cu $K\alpha$ radiation) to determine the crystallinity details of PANi and Pt/PANI along with the elemental information on Pt. The IR spectra of PANi and Pt/PANI were recorded to identify the structural changes on platinum loading. The surface topographies of PANi and Pt/PANI have been characterized by SEM using FEI Quanta 200 scanning electron microscope with energy dispersive X-rays (EDX) analysis. Cyclic voltammetry (CV) and AC impedance studies were also carried out using Electrochemical Work station (CH Instruments) to assess their electrochemical properties and to measure the charge transfer resistance of Pt/PANI in 0.1 M sulphuric acid and 0.1 M sodium sulphate solution in inert atmosphere as well as in oxygen atmosphere. The electrochemical study was carried

out with silver-silver chloride electrode as the reference electrode, platinum as the counter electrode and the pelletized PANi and Pt/PANI as the working electrode. The electrical contact on the working electrode was provided with conducting silver paste. An area of 0.6132 cm^2 of the working electrode was immersed in the conducting medium for the electrochemical study. CV was studied at a scan rate of 20 mV s^{-1} . The AC impedance study was carried out in the frequency range of 1–100,000 Hz. The applied voltage for the impedance study was maintained at the open circuit voltage of the working electrodes (0.32 V for PANi and 0.44 V for Pt/PANI Vs Ag/AgCl).

3. Results and discussion

The UV–vis spectra of hexachloroplatinic acid in aqueous medium and in toluene are shown in Fig. 3. The spectra show quantitative transfer of Pt(IV) ion to the toluene layer. The phase transferred Pt(IV) ion shows interaction with TOAB as evident from the shift in the λ_{max} value to 316 nm from 310 nm for the aqueous

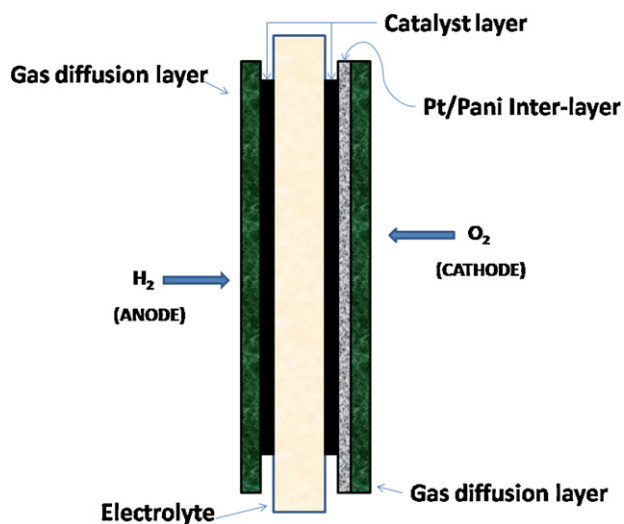


Fig. 2. Schematic representation of membrane electrode assembly in the presence of interphase.

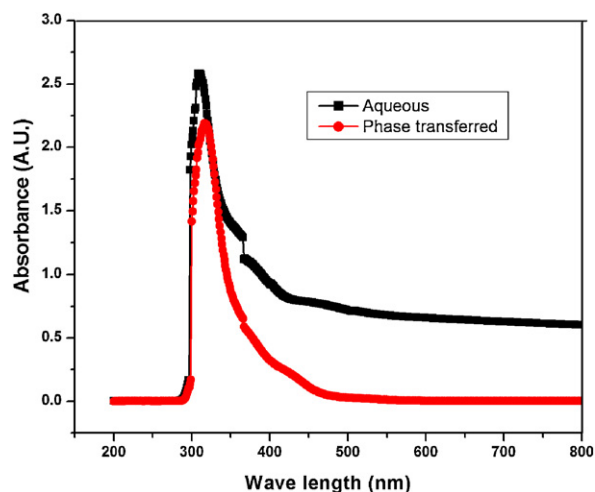


Fig. 3. UV–vis spectra of Pt^{4+} in aqueous medium and after phase transferred to organic layer.