Abstract

A solid carbon-based composite electrode made from charcoal powder and nafion binder has been developed with potential application of storage of hydrogen electrochemically that could be utilised in fuel cells for remote area power supply. The developed electrode could be employed to store energy generated by inherently variable renewable sources and hence could act as a continuous power supply source. Such potential candidate electrode, particularly for
Solid Carbon-based Electrode for Hydrogen Fuel Cell with Dual Proton and Electron Conductivity

fuel cell applications, should be both proton and electron conductive. Proton conductivity of the composite electrode was calculated from the measured proton resistance towards the flow of current using electrochemical impedance spectroscopy. Electron conductivity was calculated from the separately measured electron resistance using a standard ohm-meter or multi-meter. The effect of change in humidity on proton and electron conductivity of the composite electrode was examined. The carbon used was a common form of charcoal powder. Perfluorosulfonic acid or Nafion 117 was used as a proton conducting medium within the composite electrode. Proton conductivities in the range of 0.015 - 0.043 S/cm were recorded, while the electron conductivities were in the range of 5.79 – 6.45 S/cm. It was found that the increased level of hydration lead to increase in the proton conductivity, while electron conductivity falls down.

References


Index Terms

Computer Science

Applied Sciences
Keywords
Electrochemical Impedance Spectroscopy  Composite Electrode  Carbon  Nafion  Electron Conductivity
Proton Conductivity