3.4 Fabrication of an electrodeposited p-n junction photoelectrode for solar energy applications

KMDC.Jayathilaka*, W.Siripala*, JKDS Jayanetti #
* Department of Physics, University of Kelaniya, Kelaniya.
# Department of Physics, University of Colombo, Colombo.

ABSTRACT

Solar energy is a promising alternative energy source that can be used to replace the environmentally hazardous and expensive fossil fuel. Among the various solar energy converting devices solar cells are very important because they can convert solar energy directly to electricity or to storable chemical energy. One of the biggest challenges in this aspect is to find a suitable low cost, stable and environmentally friendly semiconductor material that can be used in solar cell applications. Cuprous oxide is considered as an important material in this regard because it is low cost, non toxic, and abundance of the starting material copper. Semiconducting cuprous oxide has a direct band gap of 2 eV and is ideal for photocatalytic water splitting reaction leading to hydrogen fuel. It is also useful as a window material in some thin film PV solar cells. Electrodeposition technique for preparation of thin cuprous oxide films is very important because it is simple, low cost and can be used to control the conductivity type (n-type or p-type). In this study, fabrication of p-n junctions of cuprous oxide for the applications in solar energy converting devices is reported. It was observed that under specific controlled conditions simple electrodeposition technique can be used to fabricate p-n junctions of cuprous oxide thin films. Spectral response measurement of the photoelectrode in a photoelectrochemical cell revealed the existence of the p-n junction and this is the first evidence, to our knowledge, of the possibility of fabricating a cuprous oxide homojunction.