

Abstract Submission Form
PINDU
October 30th, 2010

Electrochemical Preparation of p-type Ternary Metal Oxides for Solar Energy Conversion
Carrie Read and Dr. Kyoung-Shin Choi
Purdue University

Materials which photoelectrolyze water to produce H₂ and O₂ using visible light are of significant importance for solar energy conversion. As of yet, no single material has been found to effectively produce H₂ and O₂ from water while remaining cost effective and corrosion resistant. One solution is to assemble a p/n photoelectrochemical diode, where the p-type material produces H₂ and the n-type material produces O₂. Compared to the number of n-type semiconductors studied as photoanodes, the number of p-type materials studied as photocathodes to date have been limited especially for oxide materials that can be easily processed.

In this study, we report the first electrochemical routes to prepare several p-type ternary oxides having a delafossite structure, ABO₂, where A is a monovalent cation such as Cu⁺ and Ag⁺ while B is a trivalent cation such as Mn³⁺, Fe³⁺, Ga³⁺, and Al³⁺. The composition and purity of these compounds were confirmed by X-ray diffraction (XRD) and energy dispersive X-ray spectroscopy (EDX), and their morphologies were examined by scanning electron microscopy (SEM). The optical, electrochemical and photoelectrochemical properties as well as the chemical stabilities of these compounds as photocathodes will be discussed in detail.