Contribution ID: **239** Type: **Poster Presentation**

Effect of annealing temperature and time on α-hematite thin films prepared via dip coating method for photoelectrochemical water splitting applications

In this study, four layers of hematite (α-Fe2O3) thin films were prepared layer-by-layer on fluorine-doped tin oxide (FTO) using the dip coating method at withdrawal speed of 60 mm/min, annealed at 400-700oC for 2 hours, 30 minutes each layer. Following similar procedure additional samples were prepared and annealed at 700oC but different time intervals of 5,10 and 20 minutes for each of the four layers. The prepared α-Fe2O3 thin films were used as photoanodes in a three-electrode photoelectrochemical (PEC) system for water splitting. X-ray diffraction (XRD) and Raman spectroscopy studies confirmed the preparation of highly crystalline hematite thin films of good purity. The α-Fe2O3 films showed good optical absorption in the visible region because of their bandgap which was estimated to be 2.06-2.10 eV. The highest photocurrent density of 60μA/cm2 at 1.5 V vs reversible hydrogen electrode (RHE) was obtained for films annealed at 700oC for 30 mins for each layer. Electrochemical Impedance Spectroscopy (EIS) showed the reduced charge transfer resistance and increased capacitance of the α-Fe2O3 photoanodes annealed at 700oC for 30 mins for each layer, which has been related to improved photocurrent density obtained for the films. This study affirmed that the annealing of α-Fe2O3 films at higher temperatures and for prolonged time can enhanced their PEC properties for water splitting.
Keywords: Hematite photoanode, dip coating, water splitting, annealing temperature, annealing time

Apply to be considered for a student ; award (Yes / No)?

Yes

Level for award;(Hons, MSc, PhD, N/A)?

MSc

Primary author: Ms MSIZA, Nombuso (university of pretoria)

Presenter: Ms MSIZA, Nombuso (university of pretoria)

Session Classification: Poster Session

Track Classification: Track F - Applied Physics