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Effect of temperature and concentration on hematite nanostructures prepared by chemical spray pyrolysis

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Hematite films were deposited by chemical spray pyrolysis on fluorine doped tin oxide at elevated temperatures (250 - 400°C). 0.05 M, 0.10 M and 0.15 M of iron(III)chloride hexahydrate ($\text{FeCl}_3 \cdot 6\text{H}_2\text{O}$) was used as precursors for hematite with nitrogen (N_2) as the carrier gas. Scanning electron microscopy of the hematite films showed small grain sizes of < 100 nm, with a uniform distribution on the film. Raman spectroscopy revealed two A_{1g} and five E_g symmetrical vibrational phonon modes of hematite. X-ray diffraction results confirmed (104) and (110) which are dominant diffraction peaks associated with a corundum hexagonal hematite structure. The films exhibited an indirect band gap varying from 2.31–1.97 eV. The as-prepared hematite films have a potential application in photoelectrochemical water splitting to produce hydrogen gas.

Key-words: Spray pyrolysis, hematite, nanostructures.

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

Yes

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

PhD

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