

## Development and characterization of iron oxide

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### **Abstract**

The thin layers of iron oxide  $\alpha$ -Fe<sub>2</sub>O<sub>3</sub> was prepared from the precursor (FeCl<sub>3</sub>, 6H<sub>2</sub>O) and HCl hydrochloric acid by the dip-coating method. The developed thin films were subjected to analysis by XRD, IR and UV-Vis.

Several thin layers were developed by varying the concentrations of FeCl<sub>3</sub> and HCl in the solutions of the Dip-Coating. The resulting layers have been annealed at different temperatures ranging from 450 °C to 600 °C. The films showed good crystallinity was obtained from a concentration of 3 mol / liter of FeCl<sub>3</sub> and 1 mol / liter of HCl and correspond to thermal treatments of 450 °C to 600 °C.

The diffractograms corresponding to the X-rays diffraction were used for microstructural study by the method of Voigt. This analysis is to estimate the average crystallite size of the hematite and the evaluation of micro-strains present in the compound. The crystallites size were found in the field 20-130 nm. Micro-constraints correspond to deformations of from 0.001-0.007. Infrared spectroscopy confirmed the formation of hematite in the thin film crystalline state. UV-Vis spectra revealed that the annealing temperature causes an increase in the transmittance of the thin film of Fe<sub>2</sub>O<sub>3</sub>. One gap was observed between the layers obtained without annealing and the layers having a heat treatment.

**Keywords:** Powder diffraction; Dip Coating; microstructure; thin layers; method of Voigt; line profile.