TAN-F02

ELECTROCHEMISTRY OF GALLIUM AND ELECTROCHEMICAL FORMATION OF Cu-Ga INTERMETALLIC COMPOUNDS IN CHOLINE CHLORIDE-ETHYLENE GLYCOL (1:2)

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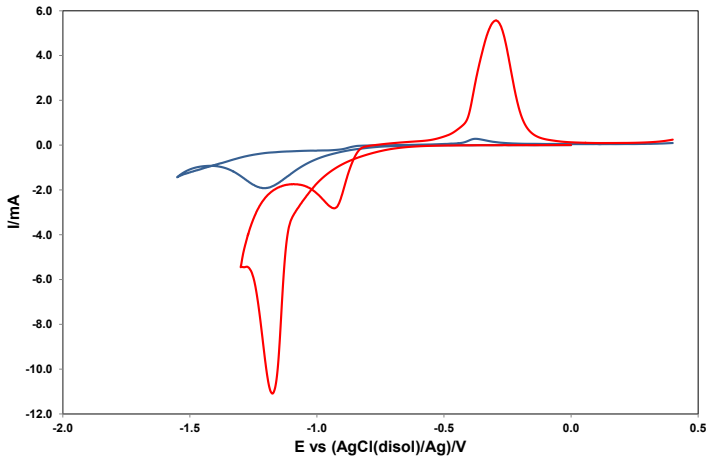
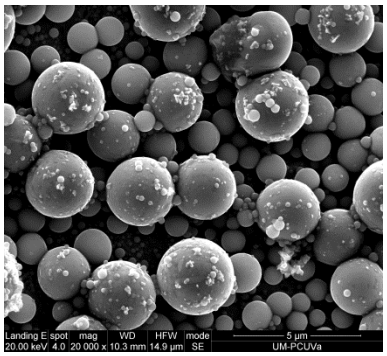
Gallium is a suitable material for producing semiconductor compounds (e.g. GaAs, GaInAs, $CuGaSe_2$ and $Cu(In,Ga)Se_2$) used in electronic and optoelectronic technology. As a part of a project to look into the ability of deep eutectic solvents (DES), as reaction media, to deposit high-quality semidonducting films, the present work is concerned with the electrochemical behaviour of gallium, in the eutectic mixture Choline Chloride – 2 Ethylene Glycol (ethaline). The study has been carried out using different substrates as working electrodes: i) Pt, Mo, W for the electrochemical deposition of Ga(liq) and ii) Cu for the electrochemical formation of Ga-Cu intermetallic compounds .



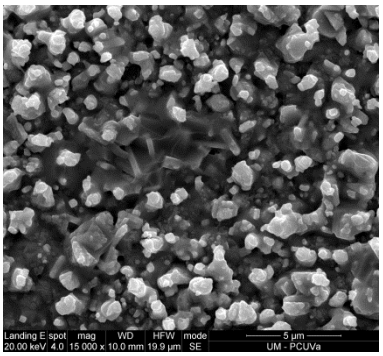
Cyclic voltammograms of a $GaCl_4^-$ solution on a Mo electrode at 80 and 100^{0}C

Ga electrodeposition is difficult from aqueous solution due to its low standard potential and the interfering hydrogen evolution reaction. The use of Ethaline, with a better thermal stability and larger potential window, eliminates the interference of solvent breakdown reactions during Ga deposition on Pt, W and Mo electrodes.

The electro-reduction of $GaCl_4^-$ solutions was also investigated at a copper substrate. Ga-Cu alloy films were obtained by continuous potentiostatic electrolysis and intensiostatic pulse electrolysis. The obtained samples, characterized by XRD and SEM, revealed the formation of $CuGa_2$.



SEM image of a deposit of Ga on a W electrode



SEM image of $CuGa_2$

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