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*Article*

**Role of Cl on Diffusion of Cu in In2S3 Layers Prepared by Ion Layer Gas Reaction Method**

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**Abstract:** Ion layer gas reaction (ILGAR) method allows for deposition of Cl-containing

and Cl-free In2S3 layers from InCl3 and In(OCCH3CHOCCH3)3 precursor salts, respectively.

A comparative study was performed to investigate the role of Cl on the diffusion of Cu from

CuSCN source layer into ILGAR deposited In2S3 layers. The Cl concentration was varied

between 7 and 14 at.% by varying deposition parameters. The activation energies and

exponential pre-factors for Cu diffusion in Cl-containing samples were between 0.70 to

0.78 eV and between 6.0 × 10−6 and 3.2 × 10−5 cm2/s. The activation energy in Cl-free

ILGAR In2S3 layers was about three times less compared to the Cl-containing In2S3, and the

pre-exponential constant six orders of magnitude lower. These values were comparable to

those obtained from thermally evaporated In2S3 layers. The residual Cl-occupies S sites in

the In2S3 structure leading to non-stoichiometry and hence different diffusion mechanism for

Cu compared to stoichiometric Cl-free layers.

**Keywords:** diffusion; ILGAR; In2S3; CuSCN

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