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Synthesis $CuInSe_2$ (CISe) Thin Films Prepared from Metal-Ethanolamine Complex Compound

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Abstract

$CuInSe_2$ (CISe) thin film was successfully fabricated from copper and indium salts with ethanolamine as precursors. All of these precursors were dissolved and formed complex compounds with ethanolamine simultaneously which deposited on soda lime glass by spin coating at 200 rpm, followed by heat treatment in the ambient atmosphere at 200°C for 120 minutes and finally selenization at 550 °C using selenium pellets under Ar (95%) + H_2 (5%) for 120 minutes to fabricate CISe thin film. Reaction mechanism, morphology and electrical properties also reported in this work.

Keyword: CISe, thin film, ethanolamine, complex compound, selenization.

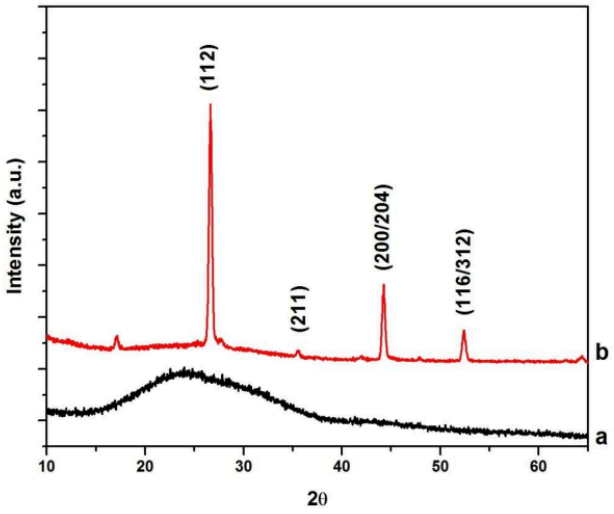
Introduction

$CuInSe_2$ (CISe) is an ideal material for thin film solar cell application due to has optimum band gap (1.01 eV) and high absorption coefficient (10^5 cm^{-1}) [1]. CISe thin films could be prepared by vacuum and non-vacuum methods. However, vacuum process such as chemical process is preferable due to low cost but still get high efficiency [2]. Although chemical process is preferable, this method using harmful solvents such as hydrazine and pyridine [3,4]. Besides that, chemical process could leaves carbon in the thin film as residue [5]. In this work, CISe thin film has been fabricated by chemical process using ethanolamine as a solvent, deposited by spin coating and followed by selenization.

Experimental Detail

Copper(II) acetate and indium(III) chloride from Aldrich were dissolved in ethanolamine Cu/In molar ratio

Results and Discussion


(112)
(211)
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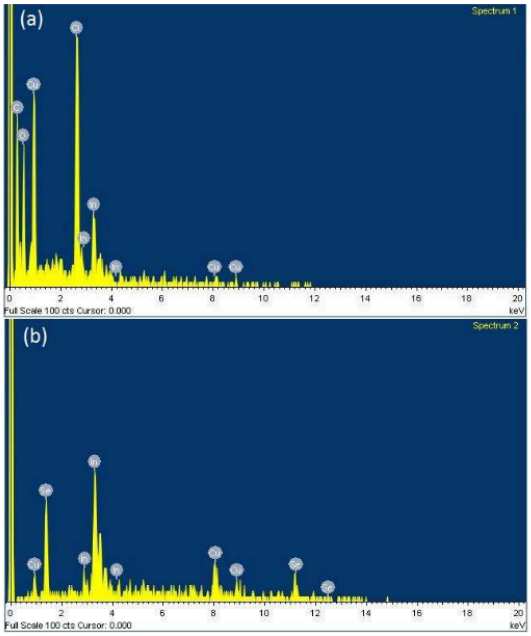
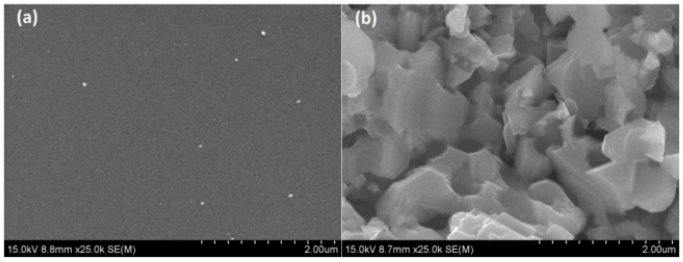
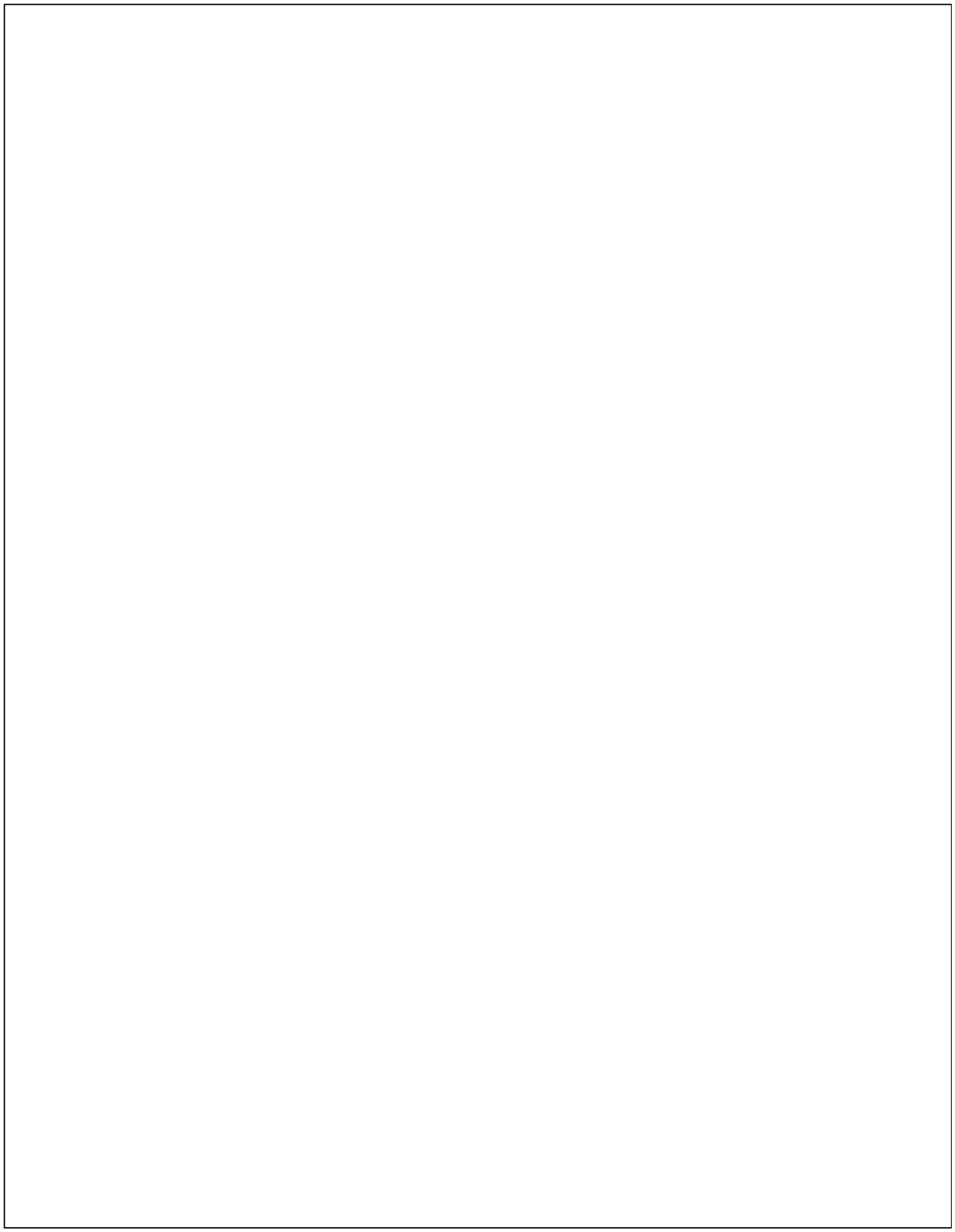
Intensity (a.u.)
b
a
10
20
30
40
50
60
2θ





% Atomic	Before Annealing	After Annealing
Cu		15.68
In		11.60
Se	0.00	24.58
C		0.00
Cu/In ratio		1.35
(Cu+In)/Se ratio		1.11



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