

DETERMINATION OF ENERGY GAP OF CuInSe_2
FROM FLAT BAND POTENTIAL MEASUREMENTS

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Ternary chalcopyrite compound CuInSe_2 is an important semiconductor material for photovoltaic solar energy conversion and for optoelectronic devices, because it (i) is a direct band gap semiconductor with high absorption coefficient, (ii) can be easily synthesised in either n-type or p-type forms, (iii) has its energy band gap in the optimal range for terrestrial solar energy conversion. In this work, CuInSe_2 samples of n- and p-type were prepared by the horizontal Bridgman method using high purity Cu, In and Se. Mott-Schottky plots for the samples with 1M KCl+0.01M HCl as the aqueous electrolyte have been obtained at 500 Hz and 1 kHz using a HP 4192A LCR meter. The electrochemical cell consisted of a Pt. mesh as one electrode and the sample as the other electrode. A saturated calomel electrode (SCE) was used as the reference electrode for potential measurements.

From Mott-Schottky plots, the flat band potentials of the n- and p-type samples were found to be -0.09 V and 0.17 V respectively. The energy band gap of the material, obtained from these results is 1.12 eV, which is in fair agreement with the optically determined energy gap of 1.10 eV, reported by other workers.

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