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Photoelectrochemical Investigations on  $\text{Hg}_x\text{Cd}_{1-x}\text{Se}$  Thin Film Electrode/Electrolyte System

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 [Keywords](#)  
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**Abstract:** Thin film electrodes of  $\text{Hg}_x\text{Cd}_{1-x}\text{Se}$  ( $0 \leq x \leq 0.2$ ) were prepared in an aqueous alkaline medium (pH  $\cong$  11) on highly conducting stainless steel substrates by chemical bath technique. Use of these films was made as an active photoelectrode in an electrochemical photovoltaic cell, comprising: electrode; sodium polysulphide electrolyte; and impregnated graphite as a counter electrode. The investigations on these cells were made by studying I-V and C-V characteristics in dark, power output, built-in-potential, spectral and photo responses. Cell performance parameters were evaluated: open-circuit photopotential  $V_{ph}$ ; and short-circuit photocurrent  $I_{ph}$ ; series and shunt resistances  $R_s$  and  $R_{sh}$ ; quantum conversion efficiency  $\eta$ ; fill factor  $ff$ ; junction ideality factor  $n_d$ ; light quality factor  $n_L$ ; built-in-potential  $\Phi_B$ ; and the flat-band potential  $V_{fb}$  were evaluated. Careful inspection of calculated values of these parameters revealed that the cell performance has been greatly enhanced with increasing electrode composition. Typically, the quantum conversion efficiency and fill factor are found to be enhanced from 0.056% to 0.31% and 31% to 52% respectively, as the photoelectrode composition varied from zero to 0.01. Incremental changes in the performance parameters, and consequently the enhancement in the cell performance are explained on the basis of electrode materials composition.

**Key Words:** MCS, P-V cells, efficiency and fill factor

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