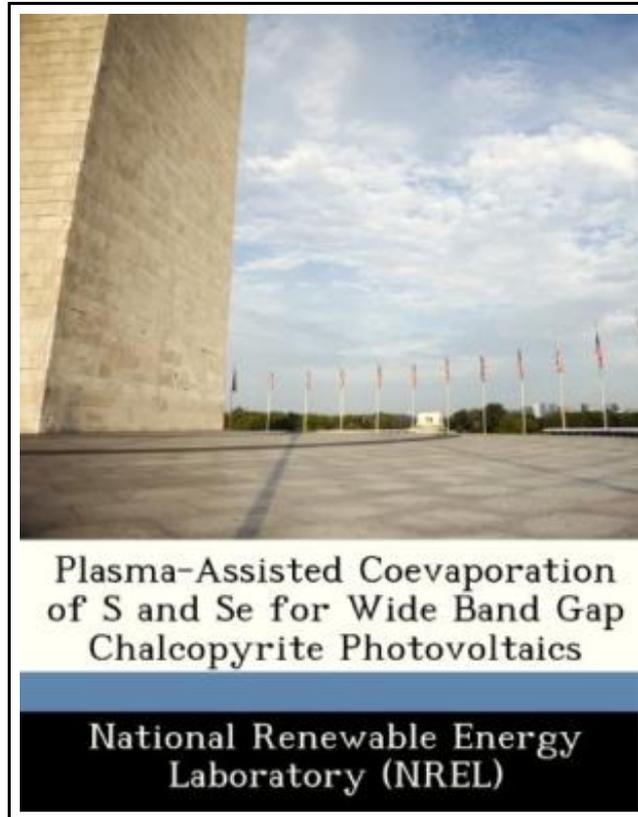


## Plasma-Assisted Coevaporation of S and Se for Wide Band Gap Chalcopyrite Photovoltaics



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## PLASMA-ASSISTED COEVAPORATION OF S AND SE FOR WIDE BAND GAP CHALCOPYRITE PHOTOVOLTAICS



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BiblioGov. Paperback. Book Condition: New. This item is printed on demand. Paperback. 26 pages. Dimensions: 9.4in. x 7.5in. x 0.2in. In this work, ITN Energy Systems (ITN) and lower-tier subcontractor Colorado School of Mines (CSM) explore the replacement of the molecular chalcogen precursors during deposition (e. g. , Se<sub>2</sub> or H<sub>2</sub>Se) with more reactive chalcogen monomers or radicals (e. g. , Se). Molecular species are converted to atomic species in a low-pressure inductively coupled plasma (ICP). Tasks of the proposed program center on development and validation of monatomic chalcogen chemistry, tuning of low-pressure monomer chalcogen sources, and evaluation of plasma-assisted co-evaporation (PACE) for CIGS co-evaporation. Likely advantages of deposition by plasma-enhanced co-evaporation include: (1) Providing potential for lower deposition temperature and/or for better film quality at higher deposition temperature. (2) Providing potential for decreased deposition times. (3) Providing high material utilization efficiency (90) that results in less deposition on other parts of the reactor, leading to lower clean up and maintenance costs, as well as longer equipment lifetime. High material utilization efficiency also reduces the total operating pressure, which is beneficial for the design and control of metal co-evaporation. Advantages include minimal metal-vapor beam spread and lower source operating temperatures. (4) Enabling deposition of wide-bandgap copper indium gallium disulfur-selenide (CIGSS) films with controlled stoichiometry. University researchers at CSM are developing and testing the fundamental chemistry and engineering principles. Industrial researchers at ITN are adapting PACE technology to CIGSS co-evaporation and validating PACE process for fabrication of thin-film photovoltaics. In<sub>2</sub>Se<sub>3</sub> films, which are used as precursor layers in high-efficiency CIGS depositions, were used this year as the first test case for examining the advantages of PACE listed above. Gradually, the investigation is being extended to the complete high-efficiency three-stage co-evaporation process. This item ships from La Vergne, TN. Paperback.

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