

PO 128-6 Analysis of Human Health Risk Throughout the Life Cycle of a Gallium Arsenide Thin Film Photovoltaic Cell. *W. Cyrs, ChemRisk, San Francisco, CA; K. Krause, A. McIntyre, EORM, San Jose, CA.*

Gallium arsenide (Ga-As) thin film photovoltaic (PV) cells have shown promise for large-scale commercial production, with conversion efficiencies reaching as high as 40.7% using concentrators.

Objective: The purpose of this study is to present an analysis of the human health risks throughout the life cycle of a Ga-As thin film PV cell.

Methods: A comprehensive analysis of the literature was performed, with critical points of human health risk identified throughout the lifecycle of Ga-As thin film PV cells. In addition, process information for the obtainment of raw materials, manufacture of PV cells, module assembly, installation, and commercial deployment were analyzed in order to further refine the risk characterization by describing exposure potential to hazardous substances. Where data was unavailable for Ga-As based PV cells, available information from other thin film PV cell types was applied.

Results: The manufacture of PV cells is a key point of risk during the life cycle of Ga-As thin film PV cells, due to the use of process chemicals such as highly toxic metal hydride gases (e.g., arsine) and pyrophoric metal-organics (e.g., trimethyl indium) as feedstock materials. On the other hand, the incorporation of PV cells into modules provides little opportunity for exposure; thus risk becomes minimal. In this study, measures used to control exposure to potentially hazardous materials are discussed, with a focus on engineering controls.

Conclusions: From this assessment, it is clear that although unique occupational hazards exist for the different life stages of Ga-As thin film PV cells, experience from the development of other PV cell types, as well as a precautionary approach, are being used to minimize the associated risks. The results of this study provide data necessary for regulatory compliance with a number of international regulations such as REACH and companion product safety requirements.