Energy Frontiers Focus Topic
Room: 102 - Session EN+MS+VT-ThA

Photovoltaics Manufacturing
Moderator: V. Ku, Satcon Technology Corporation

2:00pm **EN+MS+VT-ThA1 Waste Not, Want Not**, ***L.V. Maness, Jr.***, South Park Platinum, Inc. **INVITED**

Rapidly increasing demand for certain geological commodities, in particular semi-conductors, rare earth elements (REE) and those with other desirable characteristics, are making the extraction of formerly ignored elements of significant financial interest for miners, recyclers and other commodity producers. This need is tempered by legal and regulatory requirements that minimize pollution. Historically, miners, smelters and others have used almost all the physical, chemical and electromagnetic characteristics of ores as a means of extraction and concentration – with the exception of the unique benefits afforded by processing in vacuums. Vacuum use enables the clean separation and capture of many commodities that heretofore were wasted, either up smokestacks, in water, or in waste dumps, etc. As a side-benefit, the coating with certain REE, etc., of heated surfaces will enable the selective emission of optimized thermal frequencies for use in generating electricity using Thermal PhotoVoltaics (TPV) technologies: this major improvement in TPV efficiency will result from the suppression in a vacuum of transfer of energy via conduction and convection. In addition, for the many commodities that vaporize selectively in vacuums, a vacuum-smelter would enable the non-polluting capture of all processed materials. Such capabilities will enable revolutionizing the economics of many operations, since the removal of one component from a mix will increase proportionally the relative percentages of the other components. This development will bring closer the goal of "***No Waste Mining***" and of the separation and use of certain otherwise useful constituents, such as arsenic, which are considered harmful, are tightly regulated and whose disposal is presently a very high cost-item.

2:40pm **EN+MS+VT-ThA3 The U.S. PV Manufacturing Consortium – Bringing the Supply Chain Together**, *P. Haldar*, ***H. Efstathiadis***, College of Nanoscale Science & Engineering and U.S. Photovoltaic Manufacturing Consortium **INVITED**

The U.S. Photovoltaic Manufacturing Consortium (PVMC) – a $300 million partnership between SEMATECH and the College of Nanoscale Science and Engineering (CNSE) of the University at Albany – will bring together the entire supply chain of companies to enable the development of advanced PV-related manufacturing processes. Created as part of the U.S. Department of Energy's (DOE) SunShot initiative, which is designed to reduce the cost of photovoltaic solar energy systems by about 75 percent over the next decade, the PVMC will engage over 40 companies and organizations from throughout the solar community. Through PVMC, SEMATECH and CNSE will spearhead a unique research and development collaboration through which industry, academia and government will accelerate the development, commercialization and manufacturing of next-generation copper indium gallium selenide (CIGS) thin film PV manufacturing technologies, increasing performance while driving down the cost and risk of bringing them to the marketplace. By integrating the industrial research consortium and manufacturing development facilities models, PVMC offers lab-to-fab capabilities that will support rapid commercialization of new technologies and incubation of new start-up firms. PVMC offers the Federal government an unparalleled opportunity to promote the competitiveness of the U.S. PV industry.

4:20pm **EN+MS+VT-ThA8 Potentials and Challenges for High Efficiency Multi Junction Solar Cells**, ***Bedair***, North Carolina State University **INVITED**

The developments of multi junction solar cell will be outlined. The major challenges facing this structure will be discussed. There are several current approaches to improve the efficiency of MJ solar cells. They include: lattice matched structure, metamorphic s structure, inverted structure and GaAsN based approach. We will discuss the concept of strain balanced strained layer super lattices in improving the conversing efficiencies of lattice matched MJ solar cells.

The advantages and the limitations of each of these approaches will be presented and discussed. We also discuss the limitations facing the applications of MJ solar cell at high solar concentrations. We will address the tunnel junction issues for concentration exceeding 1000 suns. Series resistance and heat dissipation issues will also be outlined.

Finally the cost issues will be addressed with their limitations on the potential applications of this approached.

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