MATERION

COATING MATERIAL NEWS

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THE EVOLUTION OF PHOTO-VOLTAIC SOLAR CELL TECHNOLOGY

Advances in Materials and Processes

In the early 1990s, the technology used for photo-voltaic space solar cells diverged from the silicon technology used for terrestrial panels. Instead, the spacecraft application shifted to gallium arsenide-based III-V semiconductor material compositions. These in turn evolved to the modern III-V multijunction photovoltaic cell used on spacecraft with architectures built of four or more junctions. Silicon solar cells begin life as single crystal silicon with implanted p-and n junctions that generate current when illuminated with light of greater energy than the bandgap of the material.

Physics of a Photo-Voltaic Cell

The physics of photo-voltaic (P-V) cells is based on the generation of current by the separation of mobile charges, electrons and holes, in semiconductor materials. A generic silicon cell is depicted in Figure 1. Doping with a small percentage of the appropriate material creates either an excess or a deficiency of electrons (hole), depending on the particular dopant atoms. When the two doped materials are joined, a P-N junction is formed. An electric field develops across the P-N junction by the diffusion of electrons and holes in opposite directions. When the energy of the light incident on a semiconductor P-N junction exceeds the energy with which the outer electrons in the valence band are bound, electrons-hole pairs are created and mobilized by the electric field. In silicon, that energy, known as the bandgap, corresponds to wavelengths shorter than ~1000 nm. Electrons diffuse to the N-type layer, and holes to the P-type layer. The mobile charges are collected by the top and bottom electrodes, and the external circuit returns the electrons and holes to be recombined, thus generating an external current that produces power. Read more...

LET THE SUN SHINE!

Materion's Role in Solar

Evolving Over Centuries

The use of concentrated solar power is said to date back to the time of Archimedes. As the legend plays out, Archimedes used a set of mirrors to concentrate and direct sunlight onto an invading Roman fleet in 212 BC causing it to catch fire. Today, parabolic CSP mirrors produce steam to power engines that generate electricity.

Photovoltaic technology was born in the US in 1954 when scientists at Bell Laboratories created the silicon photovoltaic (PV) cell. The first solar cell was capable of converting enough of the sun's energy into power to run everyday electrical equipment. While solar cells still produce power in this manner, more recently developed concentrated photovoltaic (CPV) cells far surpass the originals in power generation. The development of thin film solar brought commercial viability and rapid energy payback to solar power plants. Read more...

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SVC Event

SVC TechCon 2017

As an established supplier for applications in thin film deposition materials, precision optics and large area glass markets, **Materion Advanced Materials** is looking forward to meeting you at this year's Society of Vacuum Coater's (SVC TecCon) Conference during May 2-3, 2017. The conference is being held at the Rhode Island Convention Center, Providence, Rhode Island.

In addition to exhibits and quality networking opportunities, TechCon 2017 focuses on core technology, innovative ideas and the exploration of the unique commercial challenges. Sessions this year will emphasize materials and processes utilized in the vacuum coating industry.

Stop by Materion Booth #900 to learn more about our key products and services that support vacuum coating applications. We are a global supplier of premier specialty materials and services for the semiconductor, LED, advanced memory, optical coatings and large area glass markets. Our offerings include precious and non-precious thin film deposition materials, inorganic chemicals, microelectronic packaging product, precision parts cleaning and precious & valuable metal reclamation.
Read more about SVC TechCon 2107

Request your copy of our Core Inorganic Chemicals Catalog at OrderChemicals@materion.com, or download the pdf.

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