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Colorado State University

Tunable Nanocrystalline CZTS for Solar Photovoltaics with No Required Annealing

Researchers in the Chemistry department at Colorado State University have recently created a novel synthesis method for nanocrystal solar photovoltaic technology to produce cells with increased electrical conductivity that do not require annealing. This novel technology utilizes the Cu_2ZnSnS_4 (CZTS) nanocrystal with selenium added to afford manufacturers exceptional control over the ratio of selenium to sulphur. These nanocrystals retain the tunable optical and electrical properties associated with similar pre-annealing cells. The cell's band gap can be tuned by varying the ratio of selenium to sulphur atoms in the nanocrystal, resulting in cells that are optimized to create as much energy as possible from sunlight. This technology also reduces trap states, which permits more efficient charge transport within the cell without annealing.

This technology will be of particular interest to solar photovoltaics manufacturers looking to produce the next generation of cheaper, more efficient solar cells. The nanocrystals are comprised of abundant elements, in contrast to first-generation cells made of rarer, and therefore more expensive, elements. Eliminating the annealing process enables unprecedented control of the sulphur-selenium ratio and also reduces the manufacturing cost, allowing these solar cells to better compete with fossil fuels in electricity generation.

Contact us for further information regarding this exciting new technology.

Patent Information
Provisional Patent Pending

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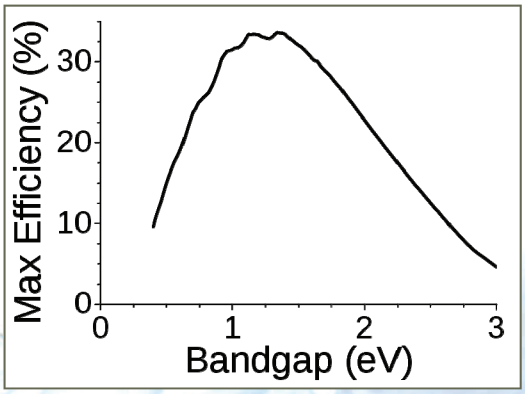

Features and Benefits

- Tunable structural, optical, electrical, and defect properties
- No expensive annealing process required
- Simple, low-temperature nanocrystal deposition onto substrate
- Nanocrystals are made from cheaper, more abundant elements

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