Iron Pyrite Thin Films From Molecular Inks

Tech ID: 22008 / UC Case 2011-200-0

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OTHER INFORMATION

KEYWORDS

Colloidal iron pyrite, Solar cell, Thin-film, CdTe, GIGS, Nanocrystals, Molecular inks

CATEGORIZED AS

- **Energy**
  - Solar
- **Materials & Chemicals**
  - Nanomaterials

BRIEF DESCRIPTION

A method for synthesizing iron pyrite (FeS2) semiconductor films on solid substrates to serve as the active layer of a solar energy conversion device (e.g. solar cell).

RELATED CASES

2011-200-0

FULL DESCRIPTION

University researchers have developed a new process for producing iron pyrite thin films from “molecular inks”; i.e., simple solutions that can be spin coated, printed, sprayed, roll coated, or otherwise deposited onto a substrate, potentially enabling cheap deposition of device-quality pyrite films over large areas. The composition of the molecular ink and the annealing step(s) used to convert the molecular species to pyrite are tuned to produce films of desired morphology (film thickness, grain size, orientation, and interconnectedness), composition (stoichiometry, impurity levels, doping), and optoelectronic characteristics (carrier density, mobility, lifetime, Fermi level, etc.)

SUGGESTED USES

Large-scale solar conversion; e.g. solar cells and solar fuels production.

ADVANTAGES

Simple and rapid deposition over large areas

Excellent control of film composition

Superior film uniformity

Simple doping and alloying

Low toxicity

Fairly low temperature

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	9,757,765	09/12/2017	2011-200
United States Of America	Issued Patent	9,048,375	06/02/2015	2011-200

STATE OF DEVELOPMENT

University researchers have successfully developed several solution chemistries to make polycrystalline pyrite thin films. Specifically two of these films follow the DMSO/ethanolamine and Pyridine routes.

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- Method To Synthesize Colloidal Iron Pyrite Nanocrystals And Fabricate Thin Film Solar Cells Of Same

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