



Ultrathin Quantum-Confined Silver Sulfide Nanoplatelets: Synthesis and Characterization

UW ID: 17-126

Inventors:

Patent Status:

Lenore Kubie
Laurie A. King
Meghan E. Kern
Joseph R. Murphy

Sabash Kettel
Qian Yang
William D. Rice
B.A. Parkinson

Patent Pending

Description of Technology

A semiconducting nanoplatelet, or NPL, is a semiconducting nanomaterial. They have applications in display technologies, light emitting devices, and photovoltaics. The traditional way of producing NPLs creates significant barriers. These come in the form of a lack of adaptability and difficulty in producing high quality products.

Researchers at the University of Wyoming have created a new way of producing silver sulfide (Ag_2S) NPLs via wet-chemical synthesis. NPLs created using this method are nontoxic and can be easily produced, manipulated, and applied. They are also ultrathin with a uniform thickness as small as $3.5 \pm 0.2 \text{ \AA}$. This creates a quantum confinement ratio of 12.6 which is twelve times smaller than the 4.4 nm 1S Bohr diameter. This quantum confinement creates about a 30% photoluminescence quantum yield which is the largest ever measured from any form of Ag_2S . These NPLs are also stable for several months in solution.

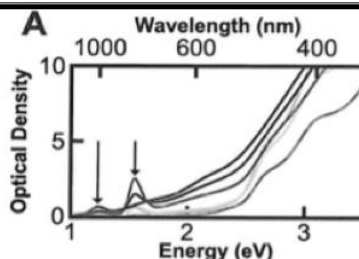
Applications

The stability of these NPLs makes them well suited for detailed optical and electrical studies. Also, because of the absorption properties of the Ag_2S NPLs, the material is feasible for optical energy harvesting. Along with those, since the NPLs are nontoxic and have such a high PL quantum yield they have a potential use in biomedical imaging.

Features & Benefits

- Ease of production, scalable
- Easily manipulated and applied
- Almost an order of magnitude thinner than any other previously synthesized colloidal nanoplatelets
- Nontoxic
- High absorption properties
- Largest photoluminescence quantum yield ever measured from any form of Ag_2S
- Stable for several months in solution

Absorption spectra of Ag_2S NPLs during synthesis in ethylene glycol



Contact Us:

Wyoming Technology Transfer and Research Products Center

1000 E. University Ave
Laramie, WY 82071

Tele: 307-766-2520

Fax: 307-766-2530

Email: Wyominginvents@uwyo.edu