



# Ultrathin Quantum-Confined Silver Sulfide Nanoplatelets: Synthesis and Characterization

## 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.

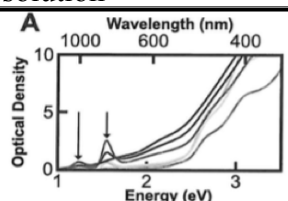
## Applications

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



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Patent Pending

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