



Novel 2d Monolayers of P-Type Copper Sulfide



The Problem

Current methods does not allow for an industrially feasible production of 2D-layered bulk copper sulfide. Such material can be used as is or be exfoliated into monolayers to exhibit significant, advantageous commercial characteristics for specific technological applications.



The Solution

Our cutting-edge invention provides a simple and scalable method for the synthesis of single stoichiometry 2D layered bulk copper sulfide, which does not require nor produce toxic compounds.



The Commercial Benefit

This invention presents significant commercial benefits.

- The synthesis yields bulk quantities and does not emit toxic gases from the reaction to the environment.
- Our 2D layered material provides a method for depositing monolayers on a substrate by sonication and dropcasting (top-down method).
- The innovation provides a new p-type 2D layered material, which is a critical building-block for the fabrication of devices such p-n junctions, heterojunctions, and complementary metal-oxide-semiconductor (CMOS) field effect transistors.



Market Potential

This is a new material which exhibits specific properties such as:

- 2D layered; can be exfoliated into monolayers
- high electrical conductivity
- p-type with bandgap of 2.5 eV

These properties make this material appealing for applications in electronic devices, thermoelectrics, and energy storage



Target Markets/Industries

- Battery electrodes (material as is or as additive)
- Monolayers or few layers for heterojunctions
- Thermoelectrics
- Additive for fabrication of solar cells



Intellectual Property

Patent pending



Team: Primary Inventor

Dr. Gilbert Daniel Nessim

- Dr. Nessim runs the laboratory for the synthesis of nanostructures in the department of chemistry and nanotechnology at Bar-Ilan University.
- Dr. Daniel Nessim holds a PhD in Materials Science and Engineering from MIT, an MBA from INSEAD (France), and Masters in Electrical Engineering from the Politecnico di Milano and from the Ecole Centrale Paris.
- Prior to his PhD, Dr. Nessim spent over a decade in high-tech industry and consulting across Europe, USA, and Israel.



Future Research

To investigate further applications for this material and to synthesize new 2D layered materials, mainly metal sulfides and phosphides.



The Opportunity

Investors are invited to license our patent through a licensing agreement with sponsored research.



Keywords

- Copper Sulfide
- P-type copper sulfide
- 2D Layered Materials
- Single Phase 2D Monolayers
- P-N Junctions
- Heterojunctions
- Complementary Metal-Oxide-Semiconductor
- CMOS
- Field Effect Transistors