UNIVERSITY OF WYOMING
RESEARCH PRODUCTS CENTER

New Families of Nitrogen Containing Graphitic Materials with Structures and Properties Modifiable with Targeted Organic Synthesis

UW ID: 16-053

Inventors:
John Hoberg
Bruce Parkinson

Patent Status:
Patent Pending

Description of Technology

Researchers at the University of Wyoming have developed an exciting breakthrough that can produce a wide-range of new **functional graphitic materials** for improving energy technologies. This discovery may have a significant impact on future technology. The initial focus includes the areas of selective ion transport membranes, battery electrodes, field-effect transistors, sensors, water splitting devices and chemical and electrochemical catalysis.

The new materials have the ability to alter the **bulk** structure of an electronic material and influence its properties using targeted organic synthesis. The researchers contend that this is an entirely new paradigm, not only in the realm of recently highly investigated 2D systems such as graphene and single layer 2D transition metal dichalcogenides, but for electronic materials in general. Functional groups added within nanopores may allow for designing materials for specific applications such as catalytic and electrocatalytic applications. Groups can also promote or inhibit 3D stacking or modifications that adjust the size of the nanopores are among many other targets.

This discovery may lead to advanced applications in materials science and technology that will contribute to low carbon energy systems for the future.

Applications

The “sky is the limit” for the applications of these many new materials. Initial focus will include chemically selective ion transport membranes, sensors, battery electrodes, field-effect transistors, water splitting devices, heterogeneous catalysis and electrocatalysis, all of which are necessary for improving future energy technologies that have the potential to significantly impact our society.

Features & Benefits

- Since both the size and the chemical composition of the nanopores of the proposed graphitic structures can be rationally modified there is the ability to prepare membranes that are specific to a particular ion.
- The ability to construct specific sized and functionalized channels for redox couples such as lithium and sodium in a highly conducting scaffold would be game changing for battery electrodes.
- The combination of tunable chemical sensitivity of the nanopores and semiconducting properties also makes these materials attractive as chemical sensors and would make these materials useful for FET based sensors.

Marketing Opportunities

All of these technologies have the potential to lead to breakthrough applications in materials science and technology that will contribute to a low carbon future for energy systems.

Contact Us:
Research Products Center
1000 E University Ave
Laramie, WY 82071

Phone: 307-766-2520
Fax: 307-766-2530
Email: WyomingInvents@uwyo.edu