Non-Aqueous 2D Material-Based Hydrogen Isotope Separation (#8043)

A proton conductor coupled to 2D material exhibit a more efficient hydrogen pump for isotope separation

Inventors at Georgia Tech describe the design and methods for production of an ion selective hydrogen pump using solid state proton conductors coated with 2D materials (graphene and hBN).

Benefits/Advantages

- **Increased efficiency** - reduction of mechanical issues found in existing proton conductors
- **Increased performance** - solid state proton conductor is rigid eliminating concern of flexibility of polymer membranes in existing devices

Potential Commercial Applications

- Nuclear Energy Applications
    - Enrichment Cascades
- Research Applications
    - Beam Production Capability

Background/Context for This Invention

Isotope separation is the process of removing excess ions to identify a concentration of specific isotopes. Currently, 2D materials have been shown to exhibit ion selectivity when operated as a simple hydrogen pump. However, delivery of the hydrogen to the 2D material is of critical importance to a functioning device with adequate efficiency. Importantly, the conductivity of unique nuclei across the 2D material is significantly higher than that of atoms or molecules. For this reason, a proton conductor must be coupled to the 2D material to fabricate a functioning device.

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More Information

Publications

For more information about this technology, please visit:
https://licensing.research.gatech.edu/technology/non-aqueous-2d-material-based-hydrogen-isotope-separation

Images:

The automated sequential delivery of multiple fluids. A varying number of delay gates imprinted in the branches are shown in the figure.

COVID-19 and flu saliva test on paper: (A) The automatic sequential delivery of multiple reagents required for virus test; (B) Water pouring into the device triggers the virus assay, allowing the presence of SARS-CoV-2 and influenza A & B viruses to be visually identified by the color changes in the corresponding detection spot