

# Non-Aqueous 2D Material-Based Hydrogen Isotope Separation

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## 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).

### Summary Bullets

- **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

### Solution 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 and More Information

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.

## **Inventors**

- Dr. Eric Vogel  
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Graduate Research Assistant

## **IP Status**

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## **Publications**

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## **Images**

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