Electrical Conduction In A Cephalopod Structural Protein

Tech ID: 29033 / UC Case 2014-267-0

BRIEF DESCRIPTION

Fabricating materials from naturally occurring proteins that are inherently biocompatible enables the resulting material to be easily integrated with many downstream applications, ranging from batteries to transistors. In addition, protein-based materials are also advantageous because they can be physically tuned and specifically functionalized. Inventors have developed protein-based material from structural proteins such as reflectins found in cephalopods, a molluscan class that includes cuttlefish, squid, and octopus. In a space dominated by artificial, man-made proton-conducting materials, this material is derived from naturally occurring proteins.

FULL DESCRIPTION

A wide variety of modern day devices, ranging from batteries to transistors, rely on the transport of protons. Scientists and engineers have come up with many artificial, man-made materials, ranging from ceramic oxides to metal-organic frameworks, to continuously develop and enhance these devices. However, there remains an untapped potential as proton conductors derived from naturally occurring proteins have generally received little attention. The inventors have utilized Proton-Conducting Cephalopod Proteins (“PCCPs”), to fabricate a proton-conducting material. PCCP’s encompass native cephalopod proteins, such as reflectins, and also their variants. This technology is versatile because genetic engineering methods can be applied to modify the proteins, enabling electrical properties of the resulting material to be tuned to different specifications.

SUGGESTED USES

- Electronics such as fuel cells, electrolyzers, batteries, sensors, and transistors
- Medical implants/devices: conduction of electrical signals
- Biological systems: sensing or manipulation of protonic flows

ADVANTAGES

- Structural protein can withstand acidic conditions and heat (up to 80°C)
- Genetic engineering methods can be applied to modify protein properties if required
- Material is soft and flexible, enabling it to mold to desired shapes or contours
- Protein is intrinsically biocompatible
- Proton conductivity value of material is within range of those of man-made proton conductors

PATENT STATUS

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OTHER INFORMATION

CATEGORIZED AS

- **Energy**
  - Bioenergy
- **Materials & Chemicals**
  - Biological
  - Electronics Packaging
  - Other
  - Thin Films
- **Medical**
  - Devices
- **Nanotechnology**
  - Electronics
- **Semiconductors**
  - Assembly and Packaging
  - Materials

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	10,557,818	02/11/2020	2014-267
United States Of America	Issued Patent	9,804,121	10/31/2017	2014-267

» **Sensors & Instrumentation**

» Biosensors

RELATED CASES

2014-267-0

STATE OF DEVELOPMENT

PCCP materials have been fabricated and characterized.

RELATED MATERIALS

» Bulk protonic conductivity in a cephalopod structural protein David D. Ordinario , Long Phan , Ward G. Walkup IV , Jonah-Micah Jocson , Emil Karshalev , Nina Hüsken & Alon A. Gorodetsky - 06/01/2014

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