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Cathodic Deposition of Conducting Polymers and Conducting Polymer-Based Hybrid Materials

A novel and cost-effective method uses electrochemical reduction to deposit conducting polymers and hybrid materials on inexpensive substrates like copper and aluminum for energy, optoelectronics, and sensing applications.

Conduction polymers combine the advantages of organic polymers and the electronic properties of semiconductors and make for attractive materials for use in energy conversion, optoelectronics, coatings, and sensing applications.

Researchers at Purdue University have developed an innovative method that relates to the cathodic deposition of conducting polymers and conducting polymer-based hybrid materials by in situ generation of oxidizing agents via electrochemical reduction, which triggers polymerization processes at the cathode. Since oxidative polymerization occurs only when the oxidizing agent is generated by electrochemical reduction, deposition of conducting polymer films at the cathode is achieved. Any substrate that is easily oxidized under anodic conditions, such as copper, aluminum, or tin, can be used as the working electrode. The growth of the polymer and the growth of the metal will affect each other during the simultaneous deposition processes and will allow for the creation of novel hybrid structures to enhance desired properties and stabilities.

Advantages:

-Allows for the use of a broader, less expensive set of substrates

-Simplifies the synthesis process

-Cost effective

Potential Applications:

-Energy conversion

Technology ID

65332

Category

Chemicals & Advanced Materials/Polymer Science & Smart Materials

Chemicals & Advanced Materials/Coatings, Adhesives & Sealants

Materials Science & Nanotechnology/Composites & Hybrid Materials

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-Optoelectronics

-Coatings

-Sensing

TRL: 3

Intellectual Property:

Provisional-Patent, 2009-04-09, United States | Provisional-Patent, 2010-04-21, United States | NATL-Patent, 2010-07-02, European Patent | PCT-Patent, 2010-07-02, WO | NATL-Patent, 2010-07-02, Republic of Korea | NATL-Patent, 2010-07-02, Japan | NATL-Patent, 2010-07-02, Canada | NATL-Patent, 2010-07-02, China | NATL-Patent, 2012-10-17, United States

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