

Methods to Improve Cycling Stability of Electrochromic Thin Films

Track Code: 2020-MEI-68819

Categories:

- Materials and Manufacturing
- Mechanical Engineering

Keywords:

- Delamination
- Displays
- Electrical Engineering
- Electrically Conductive
- Electroactive Polymers
- Electronic Device
- Materials and Manufacturing
- Materials Science
- Mechanical Engineering
- Mechanical Properties
- Nanoparticles
- Polymers
- Thin Films
- thin-film electronics

Researchers at Purdue University have developed new ways to improve cycling stability for electrochromic thin films. Cyclic changes in electrode size known as mechanical breathing occur during the use of electrochromic thin films, often contributing to material wear and disintegration because of the film's organic nature. In fabricating these films, oxidation is used to increase surface volume, but it can subsequently cause loss of material hardness. This physical alteration consequently amplifies existing material softness. Purdue researchers have been able to create a surface toughening technique that strengthens the interface where delamination occurs following oxidation. In addition, surfaces can be roughened with silica nanoparticles to enhance toughness. In testing with electrochromic thin films made from various polymers, pristine condition has been obtained over 160 cycles without any indication of strain, edge cracking, or detrimental wrinkling. This approach to creating reliable electrochromic thin films can be implemented in smart windows.

Advantages:

- Strength
- Durability

- Cost-efficiency
- Reliability

Potential Applications:

- Smart windows
- Electronic displays

People:

- Mei, Jianguo (Project leader)
- Chen, Ke
- Wang, Xiaokang
- Zhao, Kejie

Intellectual Property:

Application Date: December 22, 2019

Type: Provisional-Patent

Country of Filing: United States

Patent Number: (None)

Issue Date: (None)

Application Date: (None)

Type: Utility Patent

Country of Filing: United States

Patent Number: (None)

Issue Date: (None)

Contact OTC:

Purdue Office of Technology Commercialization
1801 Newman Road
West Lafayette, IN 47906

Phone: (765) 588-3475

Fax: (765) 463-3486

Email: otcip@prf.org