VIDEO ARTICLE

Vid. Proc. Adv. Mater., Volume 3, Article ID 2206287 **(2022)**

Energy Efficient Electrochromic Display: A Promising Trend in the Future of Display

Jinhui Wang, Guofa Cai*

Key Laboratory for Special Functional Materials of Ministry of Education, National & Local Joint Engineering Research Center for High-efficiency Display and Lighting Technology, School of Materials Science and Engineering, Henan University, Kaifeng 475004, China

Corresponding author: E-mail: caiguofa@henu.edu.cn

DOI: 10.5185/vpoam.2021.06287

Abstract

As a promising energy efficient device, electrochromic display presents information via insertion and extraction of small ions when external electrical field is applied. The electrochromic device does not consume energy to maintain the display once activated, the display information exchange process can also be realized with a very little input energy. Moreover, because of the non-light emissive characteristic, the electrochromic display is friendly to human eyes. Therefore, the electrochromic display has broad applications in energy efficient e-books, electronic shelf label and other photoelectric information devices etc. Herein, we illustrate current state-of-art strategies for the fabrication of nanostructured electrochromic materials, rational design of multifunctional smart displays, and the characterization of their performance. By analyzing the coupling mechanism between the electrochromic layers and the electrolyte, we proposed a new interface regulation strategy to improve the compatibility of ion and electron transport rate and developed an electrochromic material with optical modulation of up to 97.7%. By adjusting the interaction between the ink components and the electrode, a novel technology of large-area film formation was established with the compatible feature of the electrochromic layer and the electrode, and a large-size (50×50 cm^2) electrochromic device was firstly constructed. A novel system of multifunctional and flexible devices was demonstrated by precisely designing the matching relationship between each functional layer. The application of electrochromism was extended to the fields of wearable intelligent optoelectronic device and other fields.

Biography of Presenting Author

Cai Guofa, Distinguished Professor of Henan Province, Doctoral supervisor. Now he is working in Key Laboratory for Special Functional Materials of Ministry of Education, National & Local Joint Engineering Research Center for High-efficiency Display and Lighting Technology, School of Materials Science and Engineering, Henan University. His research interests mainly focus on electrochromic nanomaterials and large size multifunctional devices. As the first or corresponding author, the applicant has published 28 research articles in academic journals over the past few years, such as Sci. Adv., Adv. Energy Mater., Acc. Chem. Res., ACS Energy Lett., Nano Energy etc. These publications have been commented emphatically by Nature

Materials, Chem. Rev. and other academic journals for many times, and have attracted more than 3400 citations, of which six papers are identified as the ESI highly cited paper. The applicant was invited to review and arbitrate manuscripts for some academic journals, such as Nature Energy, Nature Commun. etc. Moreover, the applicant has presided over and participated in 2 national research projects each, and 5 domestic and international invention patents have been authorized.

Citation of Video Article

Vid. Proc. Adv. Mater., Volume 3, Article ID 2206287 **(2022)**

Full Video Article http://www.proceedings.iaamonline.org/article/vpoam-2206287