Improved electrochromic performance of tungsten-oxide electrode film deposited by vacuum cathodic arc plasma

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This paper reports on fabrication of tungsten-oxide (WO3) electrode films on a transparent conducting coated glass substrate by cathodic arc plasma (CAP) technique. The influences of various oxygen deliveries on structural, optical and electrochemical properties of WO3 electrode films were investigated. X-Ray Diffraction (XRD) analysis indicated that the crystal structures of WO3 electrode film were amorphous and porous and columnar form exhibited high-rate ion injection/extraction into/out of WO3 electrode films. We have demonstrated better Electrochromic Device (ECD) performance based on prepared WO3 electrode film with O2/Ar=5, that enhanced electrochromic properties in terms of shorter coloration/bleaching response times and better cycling durability. The impressive colored/bleached cycle, good ion diffusion coefficient (4.5±10^-9 cm²/s), high optical transmittance difference (~74%), high deposition rate (~15 nm/min) and fast coloration and bleaching times (7 s and 6 s) are suggesting that columnar arrays of WO3 electrode film deposited by the CAP technique is the promising smart window for potential electrochromic application.

Biography
Sheng-Chuan Hsu has completed his Master’s degree from National Tsing Hua University and presently he is working in Division of Physics, Institute of Nuclear Energy Research. He is interested in optical materials.

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