Chromogenics for Sustainable Energy: Some Advances in Thermochromics and Electrochromics

Abstract

Chromogenic materials are able to change their optical properties in response to external stimuli such as temperature (in thermochromic materials) and electrical charge insertion (in electrochromic materials). Below we review some recent advances for these types of materials. Specifically we first discuss the limitations of thermochromic VO2 films for energy efficient fenestration and show from calculations that nanocomposites containing VO2 can have superior properties and display high luminous transmittance and large temperature-dependent solar transmittance modulation. Even better results may be found for nanoparticles of VO2:Mg. In the second part of the paper we survey some recent progress for electrochromic devices and show that W oxide films have increased coloration efficiency when some Ni oxide is added. We also present initial results for flexible electrochromic foils produced by roll-to-roll coating and continuous lamination.

Keywords

Chromogenic, Electrochromic, Energy Efficiency,Nanoparticle, Roll-To-Roll Coating, Sputtering,Thermochromic, Thin Film, Tungsten-Nickel Oxide,Vanadium Oxide, Window