

WO₃-sol Synthesis from H₂O-controlled Peroxotungstic Acid and Electrochromic WO₃ thin film coating

이민^{1,2}, 김창열^{1,*}, 임태영¹, 김은경²

¹KICET(요업기술원); ²연세대학교

(sheleemin@nate.com*)

WO₃ thin film is a representative electrochromic material that can change its color when proton or lithium ion is intercalated and deintercalated by applying electrical potential. For sol-gel coating method, peroxotungstic acid has been used. Normally peroxotungstic acid is synthesized by dissolving tungsten metal in H₂O₂(30%) solution and acetic acid addition. Peroxotungstic acid has a chemical formula, WO₃·xH₂O₂·yH₂O, where 0.1≤x≤0.2, 3≤y≤10. In this research, we controlled the contents of water and hydrogen peroxide by N₂ gas bubbling or rotary evaporation. We dissolved various peroxotungstic acid into ethanol to be 1M concentration. WO₃ thin film was coated by dip coating method and dried at 100°C and heat-treated at 200°C for 1h. We analyzed half cell electrochromic property tests in 1M LiClO₄-PC solution by using Ag/AgCl reference electrode and Pt wire counter electrode. Cyclic voltammetry test was done in the range of -1V and +1V at the sweep voltage rate of 50mV/s. The film thickness of WO₃ became thinner when water contents were decreased by N₂ bubbling and rotary evaporation. Charge density of WO₃ thin film with about 240nm thickness was about 15~20mC/cm² and transmittance change at 613nm wavelength was from 90% to 5%.