

Title **WO<sub>3</sub>-CuS Photochromic smart window**

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Place I<sup>2</sup>CNER hall, I<sup>2</sup>CNER Bldg. 1, Ito campus,  
Kyushu University

### Abstract

Energy consumption for cooling system in a building is almost 50% of energy consumption in residential sector due to light and heat penetration from sunlight. Controlling light and heat penetration into a building could be achieved by smart window. The transmittance of solar irradiation in smart window is tunable based on various stimulation conditions i.e., temperature (Thermochromic smart window), light (Photochromic smart window) and electricity (Electrochromic smart window). Thailand is a country that locates near the equatorial zone, then summer is long lasting period of the year. Improving the energy efficiency of a building by smart window is considered as one of key success to reduce the electricity consumption that could lead to the low CO<sub>2</sub> emission from the electricity generation. Photochromic smart window is accomplished by coating with the composite film, which the mole ratios of WO<sub>3</sub>:CuS and the gases in the drying chamber were investigated. The coloration-bleaching efficiency of the smart window were monitored simultaneously with the transmission of near-infrared light (NIR). The mechanism of coloration and bleaching is also discussed. The suitable WO<sub>3</sub>/CuS film for photochromic glass containing of CuS 25.0 mol% with the thickness of 15.8 μm exhibited the maximum coloration/mol<sub>WO<sub>3</sub></sub> and initial rate of coloration of 7.03 and 5.68 which is 1.3 and 2 times-WO<sub>3</sub> film, respectively, after UV irradiation 5 mW/cm<sup>2</sup> for 2 h. It showed the fast bleaching 3.8-times of WO<sub>3</sub> film after exposed in air for 2 h. Moreover, the near-infrared transmittance (600-1,300 nm) of film decreased less than 1% whereas those of WO<sub>3</sub> was 23.72%.

### About the Speaker

Assist. Prof. Pailin Ngaotranwiwat received the B.Sc. and M.Sc. degree in Chemical Technology and Petrochemical Technology from Chulalongkorn University, Bangkok, Thailand, in 1996 and 1998. She received the Doctor degree in Applied Chemistry from the University of Tokyo, Japan, in 2004. Since April 2006, she is a assistance professor of Burapha University, Chonburi, Thailand. Her current interest are photocatalysis, energy storage system and smart window.

Host: Professor Yukina Takahashi

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