Electrical, Optical, and Thermal Behaviors of Transparent Film Heater Made of Reduced Graphene Oxide

Kwan Han Yoon¹,*, Ji Eun Kim¹, Byung Ghyl Min²

¹Department of Polymer Science and Engineering, Kumoh National Institute of Technology, 1 Yangho-dong, Gumi, Gyeongbuk 730-701, Korea
²Department of Materials Design Engineering, Kumoh National Institute of Technology, 1 Yangho-dong, Gumi, Gyeongbuk 730-701, Korea

Phone : +82-54-478-7687
Fax : +82-54-478-7710
E-mail : khyoon@kumoh.ac.kr

The electrical conductivity and the thermal performance of the films made of reduced graphene oxide (rGO) spray-coated on polycarbonate (PC) substrate were investigated. The electrical conductivity and the transmittance of 10 times spray coated film made from the solution with 0.08 wt% of rGO, 0.16 wt% of surfactant of 10 times were 30 kΩ/sq and 64 %, respectively. The steady-state temperature of the films increased from 25°C for 40 kΩ/sq to 100°C for 490 Ω/sq at an applied voltage of 110 V. The heat transfer coefficient of the rGO coated film, α, was obtained as 139 W/m²K using the model equation based on the thermal balance, which includes Joule heating convectional, and radiative heat transfers. The transmittance of the films decreased continuously from 73% with the increase of surface resistivity.