

## **Analyze the generation of free radicals on the surface of GO-ZnO-Si composites by x-ray spectroscopy**

Jau-Wern Chiou<sup>1,2</sup>, Jyun-Yi Li<sup>1</sup>, Ruey-Chi Wang<sup>1</sup>

<sup>1</sup>*Department of Applied Physics, National University of Kaohsiung, 811 Kaohsiung, Taiwan*

<sup>1</sup>*Department of Physics, National Sun Yat-sen University, 804 Kaohsiung, Taiwan*

Graphene, possesses the properties of high thermal conductivity, chemical stability, carrier mobility, transmittance, etc. has become a popular research topic since 2004. It can be produced by reducing graphene oxide (rGO), however, accompany a large number of oxygen-containing functional groups such as carbonyl (C=O), hydroxyl (C-OH), carboxyl (COOH), etc. These free radicals will affect the original properties of graphene. Moreover, the defects in graphene could be restored after high temperature annealing. Obviously, the types of the free radicals in GO-ZnO nanorods present particular properties after annealing if compare to GO-Si thin films. In this study, we have succeeded to prepare graphene oxide composite (GO-ZnO-Si) thin films and studied the effect of free radicals on the electronic structure of GO by x-ray diffraction, x-ray absorption and photoelectron spectroscopy.