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High-performance metal-free SERS platforms: Preparation, characterization and functional group-related enhancement mechanisms

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Highly-sensitive surfaced-enhanced Raman scattering (SERS) platforms were prepared by depositing graphene oxide (GO) layers on ZnO thin films via suction filtration followed by proper heat treatments. FTIR spectra show that oxygen-containing function groups (FGs), were significantly increased after specific heat treatments. SERS measurements showed that the FGs benefit enhancement factors (EFs) of SERS effects. In the work, the effects of GO thickness, heating temperature/time, and atmosphere on the FGs and SERS were investigated. Ultraviolet photoelectron spectroscopy (UPS) was employed to characterize electronic structures of the GO/ZnO composite with different heat treatments. The GO/ZnO composite annealing in Ar atmosphere at 100 °C for 3 hours demonstrates a high EF value of exceeding 105 for Rhodamine 6G detection. Raman mapping shows uniform intensity distribution of enhanced signals from the detection molecules. The SERS platform shows a high retention of more than 75% after aging in dark for six months. The metal-free, high-sensitive and stable GO/ZnO composites are promising for fabricating low-cost and high-performance SERS platforms for chemical and bio-sensing.

Biography

Yu-Hsuan Chen has been graduated from the Department of Materials Science and Engineering, I-Shou University, Taiwan. He is pursuing his Master's degree in the Department of Chemical and Materials Engineering in National University of Kaohsiung, Taiwan. His current research focuses on metal-free SERS platforms.

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