**InGaN quantum well:**

**A new material for surface-enhanced Raman spectroscopy**

Kun-Yu Lai

Department of Optics and Photonics

National Central University, TAIWAN

The extraordinary emission efficiency of InGaN quantum well (QW) has led to the thriving industry of solid-state lighting and laser diodes. Recently, the two dimensional nitride layer finds another promising application in surface-enhanced Raman spectroscopy (SERS), which is regarded as one of the most powerful biosensing technologies. In specific, the electrons confined by InGaN QWs can intensify the SERS signals by providing additional charge-transfer routes to the molecule/metal interface, as well as by inducing the localized surface plasmon resonance between the surface metal and QWs. These QW-contributed electrons allow every metal nanoparticle to be the SERS-active region (i.e. hot spot), not only increasing the Raman intensity, but also stabilizing the SERS signal. In this talk, I will share our recent studies on the SERS detection of single molecules and circulating tumor DNA for cancer diagnosis. Details on spectral characterizations and the potential for clinical applications will be presented.