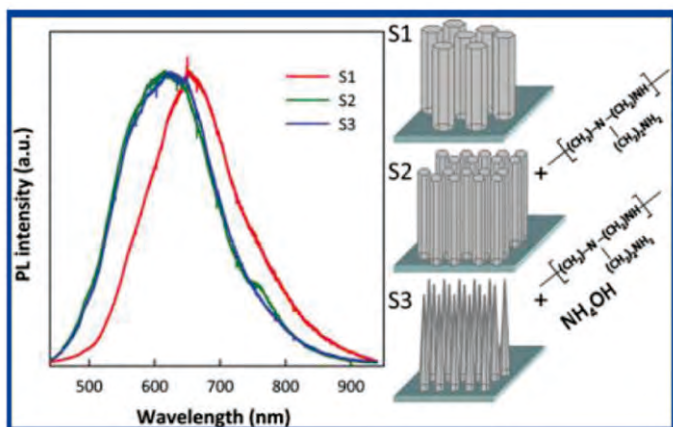
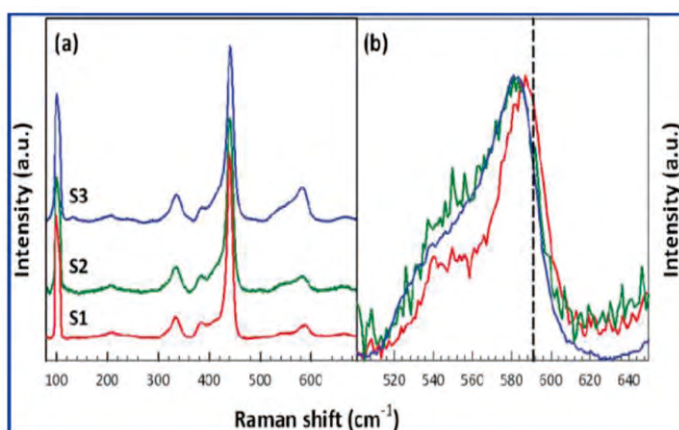


## Application Note 5

### ● The influence of Polyethyleneimine and Ammonium on the Growth of ZnO Nanowires by Hydrothermal Method



Trace chemical analysis by Surface Enhanced Raman Spectroscopy (SERS) is made quick and easy with sample vials containing our patented Ag, Au, Pd, Pt, Ru... etc. A solution containing the chemical of interest is simply placed into the vial, which is then analyzed using a Raman spectrometer. Raman signals are increased in some cases more than 1 million times allowing measurements of samples concentration as low as 10 ppb.



In this study, ZnO nanowire arrays were prepared using a hydrothermal method. During growth, polyethyleneimine (PEI) and ammonia were added to adjust the structure and optical properties of the ZnO nanowires. Emission analysis revealed visible photoluminescence emissions from ZnO nanowires produced under various growth conditions. To correlate the relationship between visible emissions and structural defects in ZnO nanowires, we employed X-ray absorption spectroscopy (XAS) to characterize the coordination number and bond length of the ZnO nanowires.

Based on analytical results, we determined that the red emission is attributed to interstitial zinc defects (Zni) and the yellow emission is attributed to interstitial oxygen defects (Oi), which is corresponding to that of both PL and Raman results.

## System Specification

Excitation Source	473,488,532,633,785,1064nm
Power	50~300mW or higher on request
Sensitivity in counts	At least 16,000 counts/sec @ 532nm test by Si wafer
Integration time	1.1ms-600s
Visible Image	Auto-exposed 9M pixels real-time image with scale
Dimension	195x195x130 mm (not including objective)
Operation	peak/FWHM searching, Spectra Overlaid, Kinetic, Baseline Correction, 3D Spectra, Zoom-in, Raman calibration, Autosave and history functions, Quantitation

