Application Note

030-AN-003

Raman and Photoluminescence Measurements of Glass and Quartz Materials

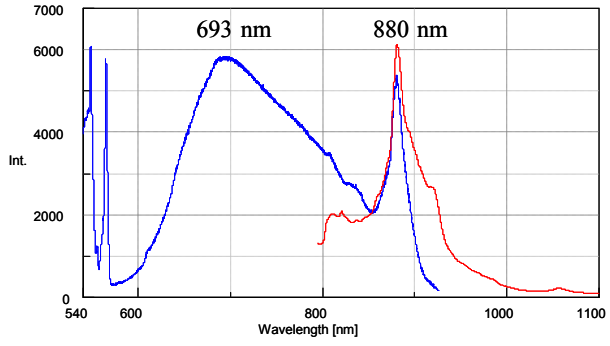
This note is intended to provide important information for users of Raman spectroscopy, specifically discussing measurements using microscope slide glass, cover glasses or glass tubes for holding the Raman sample.

A fluorescence free glass is commercially available, however, it can still cause very weak fluorescence. Even though it is very weak, it may significantly disturb the intended Raman measurement, specifically when changing the laser excitation wavelength. To estimate the influence from substrate fluorescence, the Raman and fluorescence spectra of simple microscope slide glass and quartz materials were measured using the laser excitation wavelengths of 532 and 785 nm. The Raman and fluorescence spectra of the various samples are displayed as Figure 1 (horizontal axis – wavelength; vertical axis – Raman shift).

For the measurement of slide glass using 532 nm excitation, a Raman peak in the low wave number region was observed in addition to the Fluorescence peaks centered at 693 and 880 nm. Using the 785 nm excitation, the slide glass sample offered a fluorescence peak of 880 nm. Using 532 nm excitation, the observed peaks of the slide glass may not disturb the Raman spectral measurement (Raman shift: 0 to 4000 cm^{-1}).
However, the fluorescence peak of 880nm at 785 nm excitation may overlap the Raman shift around 1385 cm^{-1} and, it may significantly disturb measurements due to the very strong intensity of the fluorescence as compared to the Raman spectrum. On the other hand, for the quartz materials, only the Rayleigh band was observed at both 532 and 785 nm excitations and there was almost no influence from fluorescence. These results suggest that the quartz glass must be used for the measurement especially at 785 nm excitation. It is our suggestion that only quartz be used for the majority of Raman measurements, wherever possible. It may be feasible, however, to use glass as a rounded surface (HPLC vials, NMR tubes, capillary tubes, etc.) if measurements using only 532 nm excitation are to be attempted.

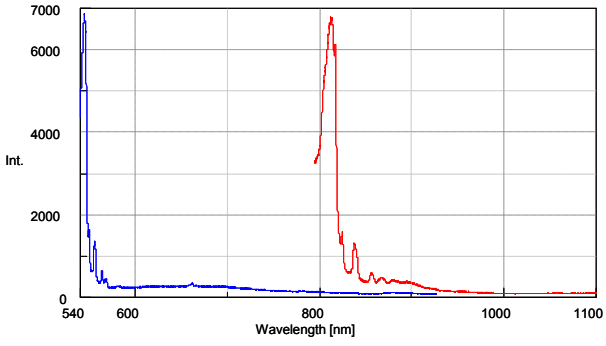
Slide glass

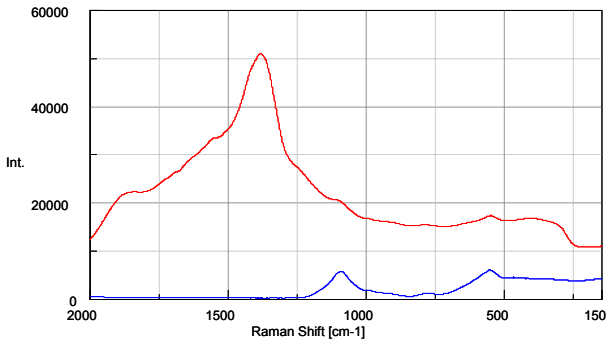
(Excitation: 532nm, 7875 nm)

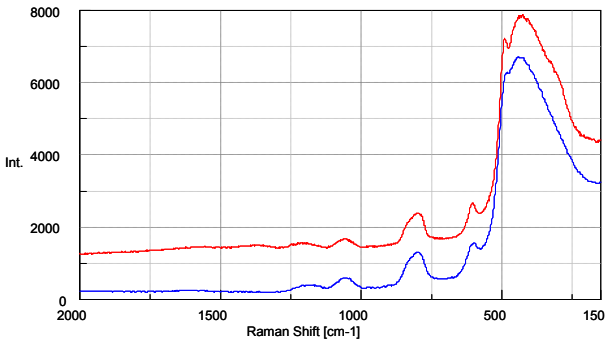


Quartz glass

(Excitation: 532 nm, 785 nm)







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