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Development of a compact transmission Raman spectroscopy for in field analysis

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In this research, we describe the construction of a compact transmission Raman spectroscopy that has been developed for on-site determination of chemical analysis. The system consists of an inexpensive green laser pointer emitting less than 20 mW of 532 nm radiation used for excitation, a notch filter for blocking light around 532 nm and a portable spectrometer (Avantes, AvaSpec-ULS3648) for detection. The notch filter has a spectral operating range from 620 to 980 nm corresponding to Raman shift in the wave number range of 615-8797 cm^{-1} with respect to 532 nm excitation. Several different samples including both solids (acrylic and polydimethylsiloxane) and liquid (limonene and ethanol) are qualitatively tested using our instrument and the results are in good agreement with literature data. The quantitative analysis of the water-ethanol binary mixture with various volume concentrations (12.5%, 37.5%, 50%, 62.5%, 75% and 100%) is also demonstrated. From this work, a reliable Raman detection capability for material analysis in the field is readily apparent.

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