NEW DEVELOPED PORTABLE NEAR INFRARED (NIR) SYSTEM USING MICROSPECTROMETER

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In recent years, a miniature spectrometer has been extensively developed due to the marriage of fiber optics and semiconductor detector array. This type of miniature spectrometer has advantages of low price and robustness due to the capability of mass production and no moving parts are required such as lenses, mirrors and scanning monochromator. These systems are ideal for use in teaching labs, process monitoring and field analyses. A portable near infrared (NIR) system has been developed for qualitative and quantitative analysis. This system includes a tungsten halogen lamp for light source, a fiber optics connected a light source, and a sample module to the microspectrometer. The size of spectrometer can be as small as 2.5 cm x 1.5 cm x 0.1 cm. Wavelength ranges can be chosen as 360-800 nm, 800-1100nm and 1100-1900 nm depending on the type of detector. The software consists of various tools for multivariate analysis and pattern recognition techniques. To evaluate the system, long and short-term stability, wavelength accuracy, and stray light have been investigated and compared with conventional scanning type NIR spectrometer. This developed system can be sufficiently used for quantitative and qualitative analysis for various samples such as agricultural product, herbal medicine, food, petroleum, and pharmaceuticals, etc.