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Spectroscopy system using two dimensional detectors for undergraduate student laboratory

In this paper, we propose spectroscopy system, which use Complementary metal–oxide–semiconductor (CMOS) image sensor as two dimensional detectors, for studying in undergraduate laboratory. The goal of this system is to make students understand internal structure of commercial spectrometer and characteristic of light spectrum. Light with various wavelengths propagated via variable slit, which is used to control width of spectrum, has been focus on reflective grating and then separated to various spectrum. After that, separated spectrum has been recorded by CMOS image sensor which consists of two dimensional array pixels. Each pixel can be determined as wavelength of light by calibrating with Mercury lamp which is standard light source that has exact spectrum value. By using CMOS image sensor, student can observe distribution of real light spectrum and spectrum graph together. The results show that characteristic spectrum obtained from our system is identical with commercial instrument. Moreover, our system not only be applied for undergraduate studying, but also might be applied with other optical spectroscopy method in future.

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