LOW COST RAMAN SPECTROSCOPY FOR THE IDENTIFICATION OF TRANSPARENT LIQUIDS

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ABSTRACT

This work presents the development of a low-cost Raman spectroscopy system, aimed at the detection of clear liquids that cannot be detected using colorimetric methods. Given the needs (in Bolivia) of control and inspection of chemical compounds in local and imported goods, the development of molecular spectroscopy systems is presented as an accessible solution. The developed system was based on a modified version of a classic spectrometer, with a measured spectral resolution of 2nm and a width of 200nm. A 405nm and 5mW laser diode, a clear cuvette with the sample, and an auxiliary lens were used for the generation of Raman scattering. The system used a thermoelectrically cooled CCD camera as the detector and its images were integrated vertically for spectrum extraction. As part of validation tests, Raman spectra of water, ethanol and ethyl acetate were obtained. Also, the system was able to get a Raman spectrum from a mix of ethanol and water. In every case, there was a coincidence between the obtained spectra and the references, showing a correct detection. After these results, the system showed great potential as low cost analytic tool for detecting molecular compounds. The results also showed that resolution and contrast could be improved by the use of specific cutoff filters in future versions of the system.

Keywords: Spectroscopy, Raman spectroscopy, Molecular Spectroscopy, Laser Spectroscopy.

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