

Design and implementation of vibrational spectroscopy analysis

Weng, Zaishan

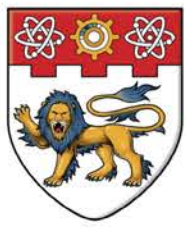
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Design and Implementation of Vibrational Spectroscopy Analysis

Background

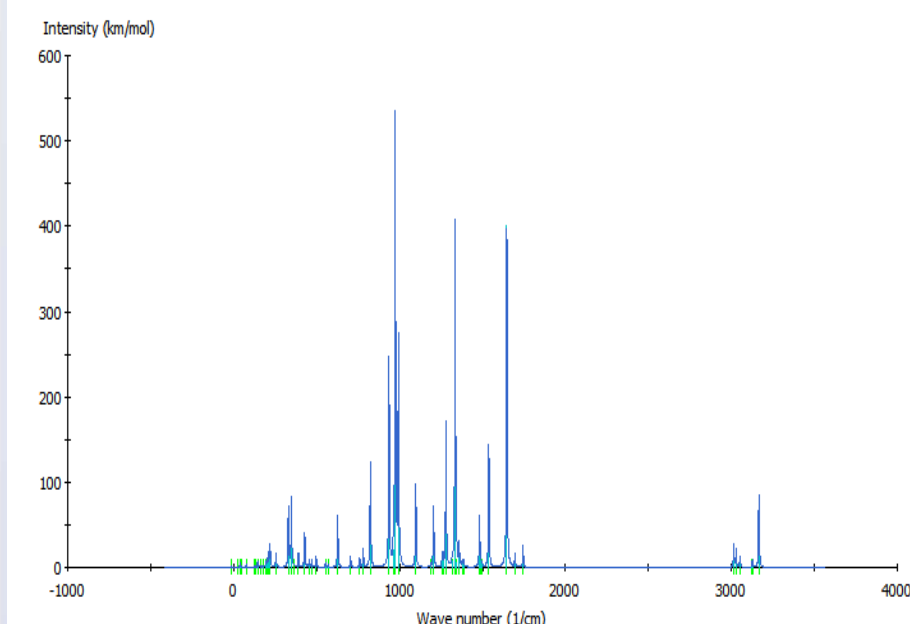
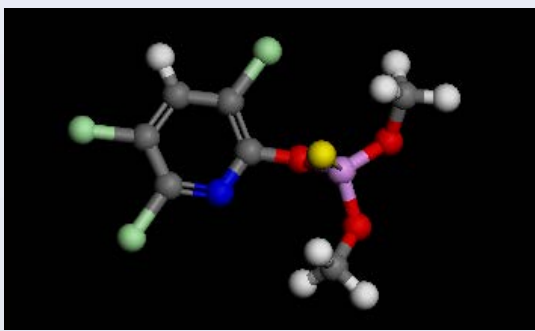
The spectroscopy technique is based on the Raman effect where the inelastic scattering of light due to energy exchanges between the incident photons and the vibrating molecules give rise to a spectrum of scattered light. This unique spectrum can be used to identify the substance being tested.

Objectives

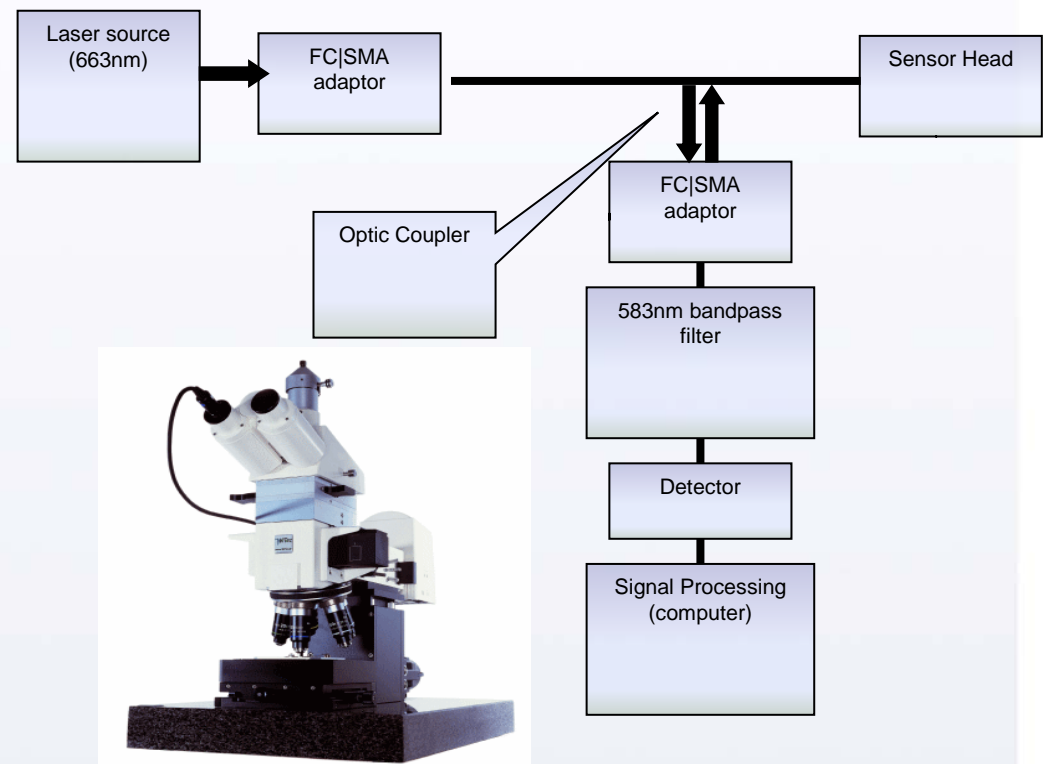
1. Design of a portable Raman System
2. Formulate the vibrational spectra of substance
3. Simulate surface enhancement of Raman signal

Detection of Pesticide on Fruits

Pesticide residual is a wide-spread problem in modern agricultural context. Chlorpyrifos is a commonly used pesticide on fruit. The structure and vibrational shift of Chlorpyrifos is being simulated and determined for further analysis.



System Block Design



Surface Enhancement Modeling

Since the Raman signal is extremely weak (about 10^{-9}), the surface enhancement is necessary. It is commonly done using silver nano particles on the sample surface. Our project explores on the most effective shape and separation distance between the nano particles that can maximise enhancement.

