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# Design and implementation of vibrational spectroscopy analysis

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### **FYP-URECA-TG**

**Final Year Project -URECA - Techno Garage** 

Category: 3

Project ID: EEE07220

URECA undergraduate Research Experience on CAmpus

# **Design and Implementation of Vibrational Spectroscopyic Analysis**

#### **Background**

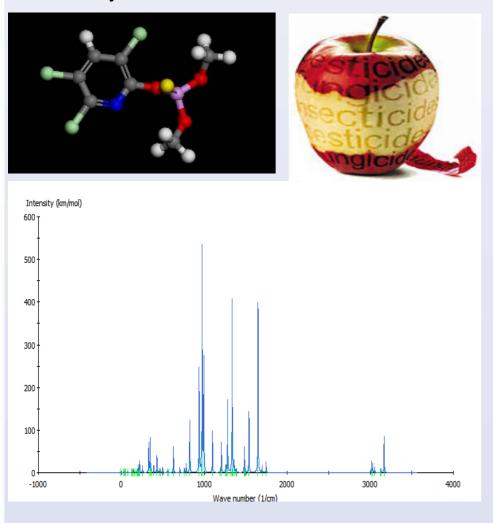
The spectroscopy technique is based on the Raman effect where the inelastic scattering of light due to energy exchanges between the incident photons and the vibrating molecules give rise to a spectrum of scattered light. This unique spectrum can be used to identify the substance being tested.

#### **Objectives**

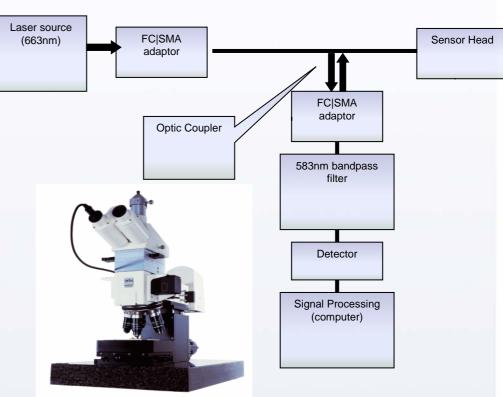
- 1. Design of a portable Raman System
- 2. Formulate the vibrational spectra of substance
- 3. Simulate surface enhancement of Raman signal

#### **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.

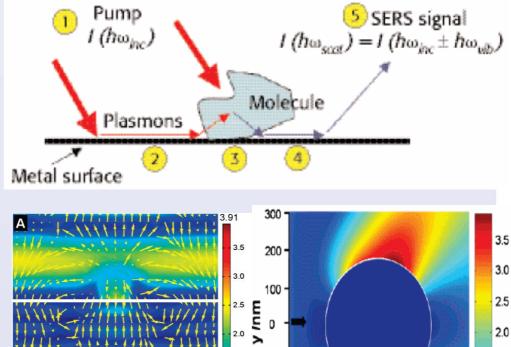


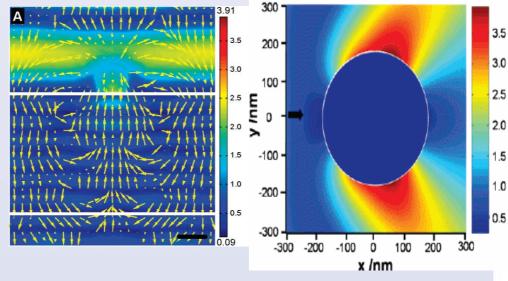
## **System Block Design**



#### **Surface Enhancement Modeling**

Since the Raman signal is extremely weak (about 10<sup>-9</sup>), 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.





School of Electrical and Electronic Engineering

**Project Title: Design and Implementation of Vibrational Spectroscopy Analysis** 

**Student: Weng Zaishan** 

**Supervisor: A/P Shum Ping and A/P Li Chang Min Collaborators: Dr Chen Zhihao and Dr Bao Qiaoliang**