



# **A Low-Cost and Accurate Olive Oil Analyzer**

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## **Objective:**

Implementing a low-cost and accurate spectral sensing system for determination of adulterants in olive oil.

## **Introduction:**

There are two general important categories of adulterants in olive oil:

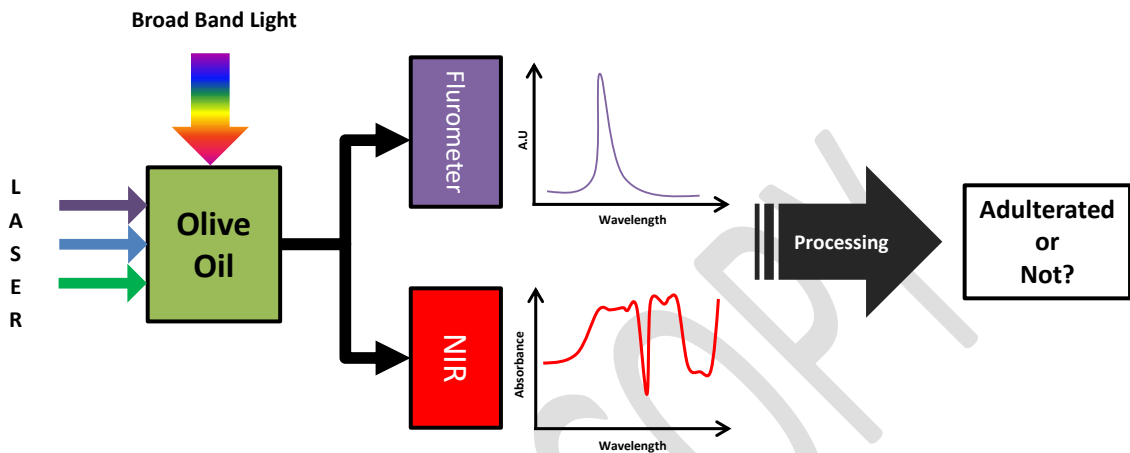
1. Mixing extra virgin olive oil with other edible oils including the following oils:
  - a. Hazelnut Oil : >5%
  - b. Sesame seed oil : >2%
  - c. Corn oil:>2%
  - d. Canola oil:>1%
  - e. Very old olive oil: >5%
  - f. Coconut oil:>1%
  - g. Sunflower oil:>1%
  
2. Presence of solvents in olive oil
  - a. Presence of hexane
  - b. Presence of alcohols such as iso-propanol

Both types of above mentioned adulterations could cause serious problem such as cancer. Therefore there is high demand for a low-cost, accurate, and ease-to-use sensing mechanism for distinguishing a genuine olive oil from the adulterated ones .

## **The Olive Oil Sensor:**

The implemented portable system is based on accurately calibrated spectroscopic system. The core of the system is a revolutionary dual mode fluorescence/NIR spectrometer that uses three laser wavelengths together with broad band source of light to obtain the fluorescence and the NIR absorption curves of the sample under test. The system heart is the in-house developed volume grating which is highly efficient and extremely low-cost which leads to a cost-effective sensing system.

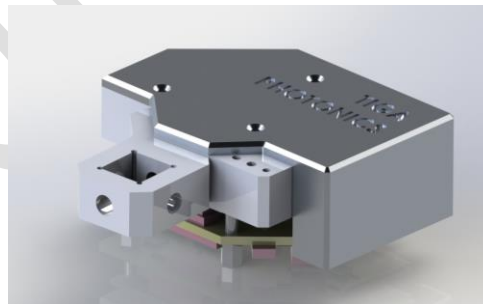
Statistical and intelligent learning algorithms then extract the information about the various adulterants present in olive oil. The obtained data is utilized for calibrating the system for all kinds of olive oil adulteration.



**Fig.1 : The block diagram of the olive oil sensing system**



**(a)**



**(b)**

**Fig.2 : a) The stand alone NIR olive oil sensor. b) The Fluorometer sensor.**