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Rapid raman detection of extra virgin olive oil adulteration

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The adulteration of pure extra virgin olive oil (EVOO) with cheaper edible oils has been a major concern for consumers for some time. Thousands of truckloads of food products are brought into the US every day, making it impossible to police every truckload using current techniques. In order to police a higher number of oils and other foods imported into the US, we must have a much faster method for detection of EMA in food products. Raman spectroscopy offers such a solution. While the current methods of testing samples taken by the Center for Border Patrol (CBP) involves sending those samples to a lab, and waiting up to three weeks for results, we show a method where each border checkpoint could be equipped with a Raman spectrometer, and with little training, measurements can be made within 5 seconds so that Border Patrol agents can test several samples from each truckload entering the US. For this study, samples are kept inside clear glass containers, while a 785 nm Raman system is used to take measurements as the Raman probe is placed against the glass container. Several types of oils at various concentrations of adulteration are used. Ratios of peak intensities are used to analyze raw data, which allows for quick, easy and accurate analysis. While conventional Raman measurements of EVOO may take as long as 2 minutes, all measurements shown here are for integration times of just 5 s. It is found that adulteration of EVOO with cheaper oils is detectable at concentrations as low as 2.5% for all oils used in this study. This is more sensitive than standard techniques, but only requires a fraction of the time to test each sample.

Biography

Carlton W Farley III has used Raman spectroscopy for detecting a variety of chemicals in the past few years, including explosives, rocket fuel propellants and EMA in food items. He completed his PhD in December 2015 at Alabama A&M University, where he began his research on “Improving EMA detection in extra virgin olive oil as well as honey, flour and baby formula”. He is currently a Research Associate at Alabama A&M University, where he trains graduate students as well as continues research on “Detection of EMA in food items”.

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