Seminar

Institute for Plasma Research

Title : SERS-based detection of adulterants in spices and fruits

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Date : 24th August 2021 (Tuesday)

Time : 03.30 PM

Venue : Online - Join the talk:
https://meet.ipr.res.in/Dr.MaheshSaini

Abstract :

Now-a-days, adulteration in spices is very common. In particular, adulterated turmeric powder may have mentanil yellow, lead chromate, etc. However, chilly powder may contain adulterants such as Sudan dyes, Rhodamine B, etc. On the other hand, in the markets, apples are made attractive by polishing them with various types of waxes such as beeswax, petroleum jelly etc. Adulteration is primarily intended for economic gains. However, a prolonged consumption of adulterated food may lead to serious health risks.

In this study, we have utilized Surface Enhanced Raman Scattering (SERS) technique for detection of these hazardous dyes in spices and polished waxes on apples. A SERS substrate is fabricated using nanoscale silicon ripples (R-Si) (wavelength = 30 nm) by low energy ion-beam bombardment followed by the deposition of highly ordered Ag-nanoparticles (Ag-NPs) along these ripple patterns. Different concentrations of dyes (starting from 10^{-2}M to 10^{-9}M) are mixed with saturated solutions of turmeric and chilly powders and their presence is probed using Ag-NPs/R-Si SERS substrates. It is observed that an ultralow concentration of these adulterant dyes can be detected using these SERS substrates [1-3]. This study paves a way toward improving the efficacy of adulterants detection in foods.

References:
[1] SERS based detection of Dichlorvos pesticide using silver nanoparticles arrays: Influence of array wavelength/amplitude Sebin Augustine, K.P. Sooraj , Vivek Pachchigar , C. Murali Krishna , Mukesh Ranjan Applied Surface Science 544 (2021) 148878
[2] In-plane optical anisotropy and SERS detection efficiency of self-organized gold nanoparticles on silicon nanoripples: Roles of growth angle and post growth annealing Mahesh Saini, Sebin Augustine, Mukesh Ranjan, Tapobrata Som Applied Surface Science 512 (2020) 145703.
[3] SERS based detection of glucose with lower concentration than blood glucose level using plasmonic nanoparticle arrays Sooraj K P, Mukesh Ranjan, Rekha Rao, Subroto Mukherjee, Applied Surface Science 31 (2018) 576.