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# HYBRID FLEXIBLE PLASMONIC SERS SUBSTRATE WITH IMPROVED ASSEMBLAGE OF AG@SIO$_2$ NANOCUBES ON A MINIATURIZED PAPER PLATFORM FOR DETECTION OF MELAMINE

**Menbere Leul Mekonnen**
National Taiwan University of Science and Technology, Taiwan

**Surface Enhanced Raman Scattering (SERS), benefitted by its fingerprinting ability of molecules can be a reliable option for trace analysis in the food matrix. Since the sensitivity of a SERS method is highly dependent on the degree, to which the Raman signature is enhanced, fabrication substrate that could adequately amplify the local field through excitation of localized surface plasmon resonances (LSPRs) is critical. Hence, control over the nanostructures morphology and improving their inter-particle distance is important for obtaining improved SERS activity. In addition, flexible platforms like paper offer the means for improving the nanostructures assemblage with ease of fabrication at low cost and improved sample collection efficiency. Here in, inexpensive, flexible paper-plasmonic hybrid SERS substrate is presented by loading Ag@SiO$_2$ nanocubes on a miniaturized filter paper through vacuum filtration. The miniaturized sensing platform owes a reasonable distribution and inter-particle spacing of nanocubes. The fibrous structure of paper promotes the assemblage of sharp-edged nanostructures which significantly improve their distribution and SERS activity. The thin silica shell improved the stability and inter-particle spacing of silver nanocubes in the sensing platform, rendering enhanced SERS activity through plasmon-coupling effect as compared to a conventional rigid substrate. Assessment of analytical performances of the substrate for melamine quantification showed a good linearity ($R^2$=0.9947) up to 1 mg/L with a limit of detection 0.06 mg/L. The detection limit in liquid milk was down to 0.17 mg/L, which is below the permissible.**

menberelm@gmail.com