

**University of Puerto Rico
Mayagüez Campus
Chemistry Department
Departmental Seminar**

**by
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**Abbott Room
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11:30 AM**

**Novel bio-inspired and sample translation approaches for the Raman detection
of pharmaceutical products in water**

Over the years the widespread use of pharmaceuticals and personal care products (PPCP's) has become an emerging environmental problem affecting agriculture, ecological systems, and water quality as well. Surface Enhanced Raman Scattering is emerging as a practical alternative for the detection and characterization of pharmaceuticals and bioactive compounds. This process demands the construction of new high performance substrates, with improved plasmonic responses to ensure sensitive and reproducible trace analysis determination. This research focus: (1) on the development of bio-inspired nanocomposite structures, which offer the opportunity to develop nanostructures with higher and more reproducible plasmonic fields. (2) The fabrication of an economical sample translational portable device (STPD), which could be used for on-site screening and real time analysis. The Fabrication, characterization and evaluation of nine bio-inspired nano plasmonic substrates was achieved with two of the arrays (Sunflower and the Orchid); as the most promising patterns as SERS substrates with enhancement factor (EF) on the $10^8 - 10^9$ range. This fact along with the development of a STPD have become an innovative tools for the Raman analysis of chemical agents such as Rhodamine 6G, 4-carboxybenzene sulfonamide and fluoroquinolones. The analytical capabilities to perform qualitative and quantitative analysis of such compounds will be discussed. Alternatives for the removal of PPCP's will also be presented.

References:

1. De Jesús, M. A.; Giesfeldt, K. S.; Sepaniak, M. J., Use of a Sample Translation Technique to Minimize Adverse Effects of Laser Irradiation in Surface-Enhanced Raman Spectrometry. *Applied Spectroscopy* **2003**, *57* (4), 428-438.
2. De Jesús, M. A.; Giesfeldt, K. S.; Oran, J. M.; Abu-Hatab, N. A.; Lavrik, N. V.; Sepaniak, M. J., Nanofabrication of Densely Packed Metal-Polymer Arrays for Surface-Enhanced Raman Spectrometry. *Applied Spectroscopy* **2005**, *59* (12), 1501-1508.
3. Olavarría-Fullerton, J.; Velez, R. A.; Wells, S.; Sepaniak, M. J.; Hernández-Rivera, S. P.; De Jesús, M. A., Design and Characterization of Hybrid Morphology Nanoarrays as Plasmonic Raman Probes for Antimicrobial Detection. *Applied Spectroscopy* **2013**, *67* (11), 1315-1322.