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In person and on Zoom:

<https://us02web.zoom.us/j/5263741849?pwd=na7RP4GdtrEQHorrP9YnOjlPR5WJHD.1&omn=89215863271>

Personal Meeting ID: 526 374 1849 Passcode: caes1875

From Phytomining to Implications and Applications of Nanotechnology: The Journey of a UTEP Miner



Prof. Jorge L. Gardea-Torresdey

Dudley Professor of Environmental Science and Engineering and Professor of Chemistry

Wednesday, October 2, 2024

10:30 A.M. to 12:00 P.M.

Coffee & Bakery Items will be served

**Jones Auditorium, The Connecticut Agricultural Experiment Station
123 Huntington Street, New Haven, CT**

The extensive work of my research group at the University of Texas El Paso (UTEP) in the field phytoremediation led us to discover, for the first time, that plants could form gold nanoparticles (NPs) from the absorbed gold ions. This discovery allowed us to be part of important nano centers, including the UC Center for the Environmental Implications of Nanotechnology (UC CEIN) and others. At the nanoscale, materials acquire unique physico-chemical properties that can be manipulated for tailored purposes and, as such, there has been an important increase in NPs used in a range of sectors, including agriculture. Nano-enabled agriculture is at the early stages of development, but we strongly believe it is a road that may lead directly to sustainable global food security. Our group has been studying, for some time, the effects of metal NPs (nano-CeO₂, nano-TiO₂, nano-ZnO, and nano-CuO) on terrestrial plants, specifically crop plants. Different plant species have been exposed to NPs at varying concentrations. Synchrotron-based techniques, including X-ray absorption near edge structure (XANES) and micro-X-ray fluorescence (μ -XRF), have been used to study the mechanisms of transformation of NPs in some major crops. In summary, our results show that the mechanisms of transformation of metal NPs are different and depend on several factors. It is true that, broadly speaking, the small size and high surface-area-to-volume ratio in NPs can be extremely beneficial. However, using this justification without properly understanding the mechanisms of interaction between NPs and crops, may in the long run undermine the potential of nanotechnology in agriculture.