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Sustainability Seminar Series, 2018

Feb 6th, 4:00 PM - 5:00 PM

Using Natural Resources to Control the Fate of Contaminants in the environment

Lucia Rodriguez Freire
New Jersey Institute of Technology

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The MSU Sustainability Seminar Series Presents:
**Using natural resources to control the fate of
contaminants in the environment**

WHEN: February 6, 4:00 pm

WHERE: CELS 120 lecture hall

Dr. Lucia Rodriguez Freire
New Jersey Institute of Technology



Dr. Rodriguez-Freire is an Assistant Professor in Environmental Engineering at the John A. Reif, Jr. Department of Civil and Environmental Engineering at NJIT. Lucia's Laboratory of Applied Biogeochemistry for Environmental Sustainability investigates the mechanisms of interaction between biological and inorganic systems to minimize waste, prevent pollution, and remediate and treat contaminated sites. Lucia earned a B.S. in Chemical Engineering from the University of Santiago de Compostela, Spain, and she has a M.S. and a Ph.D. in Environmental Engineering from the University of Arizona. She also did two postdoctoral works, one at the University of Arizona, and another at the University of New Mexico.

Environmental contamination poses an increased health risk to those communities living nearby impacted sites, and it is imperative to find sustainable remediation strategies to restore the natural systems. My research investigates natural biogeochemical processes and the use of ubiquitous materials to the design remediation solutions that are site-specific and take into consideration the needs of the affected communities.

The first example is the investigation of uranium (U) accumulation in plants growing along the Rio Paguete, which flows through the Jackpile Mine, and open-pit U mine listed on the National Priority List as a Superfund site. Two villages of the Laguna Pueblo in New Mexico are in the vicinities of Jackpile Mine. Salt cedar plants showed U accumulation in their roots ranging from 25.2 – 58.9 mg kg⁻¹. Microscopy and spectroscopy analyses of roots indicates that U appears to be entrapped in the cell walls in the roots. This preferable binding of U to the root cell walls may explain the U weak translocation toward salt cedars leaves.

The second example is the response to the Gold King Mine spill that released a mixture of metals in the Animas River in southern Colorado. The Animas River flows from a heavily mineralized area (San Juan Mountain, Colorado) to an intensive agricultural area (Farmington, New Mexico), home of the Navajo Agricultural and Product Industry. Sediment samples collected 2 weeks after the spill showed lead, copper and zinc associated with clays, iron-(oxy)hydroxides, and jarosite.. Jarosite solubility at near-neutral pH and biogeochemical processes occurring downstream affect the remobilization of metals in sediments.

This work has unique implications to better understand the delicate equilibrium of metals and surface water, sediments and plants downstream mine waste. This information is essential for determining the potential for metals exposure and to inform remediation strategies.