

**DEPARTMENT OF CHEMISTRY AND ENVIRONMENTAL
SCIENCE
VIRTUAL SEMINAR SERIES
FALL 2020**

DATE: WEDNESDAY, DECEMBER 2

TIME: 1:00-2:20pm

LOCATION: Meeting number: 120 119 5689

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GUEST SPEAKER

Silvana Andreescu

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Clarkson University

Potsdam, NY

TOPIC

Nanomaterials Sorbents for Environmental Sensing and Remediation

ABSTRACT

Rational design of nanomaterials with predicted surface properties and selective binding characteristics offer solutions to many environmental and sustainable challenges faced by society today. This presentation will describe an emerging class of materials that are rationally designed to achieve selective binding of water contaminants for environmental sensing and remediation. Specifically, it will illustrate the development of a new class of cerium-based nano and microporous based materials that have exceptional stability, high surface area, highly porous hierarchical structure and the ability to bind phosphates and organophosphate pesticides from water. These materials also have the ability to bind the phosphate backbone in DNA enabling the immobilization of DNA aptamers for the development of specific biosensors and nanosensors. An example illustrating the development of a cerium-based metal organic framework (Ce 1,4-benzenedicarboxylate MOF) as a high capacity sorbent for phosphate removal from eutrophic waters due to the high binding affinity of phosphate with its open metal sites will be discussed. This MOF can also be used to neutralize the nerve agent

paraoxon; the Ce-MOF showed significantly enhanced degradation ability when cerium nanoparticles are encapsulated inside the MOF, as compared to the use of the freely dispersed nanoparticles. These results help establish new design principles for developing next generation material sorbents and artificial receptors to bind, reduce and quantify phosphorus and mitigate the negative effects of the organophosphates in the environment. These materials can be used building blocks to construct devices and systems for improving sustainability of water systems.

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