

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

**DATE:** WEDNESDAY, SEPTEMBER 9

**TIME:** 1:00-2:20pm

**GUEST SPEAKER**

Alexei Khalizov

Associate Professor

Department of Chemistry & Environmental Science  
New Jersey Institute of Technology  
Newark, NJ

**TOPIC**

The Chemistry of Atmospheric Mercury

**ABSTRACT**

Mercury is a persistent environmental pollutant, entering the atmosphere mostly in elemental form and leaving in various oxidized forms. We still know little of the molecular composition of atmospheric oxidized mercury and most of this knowledge has come from quantum chemical calculations. I will talk about our work to develop a novel experimental analytical technique for molecular analysis of gaseous oxidized mercury. The technique is based on the ion drift - chemical ionization mass spectrometry (ID-CIMS), where neutral analytes react in a drift tube with appropriate reagent ions to form well-defined product ions, which are detected by the mass spectrometer. I will show the process of identifying most appropriate reagent ions, where we were guided by chemical intuition, quantum chemical calculations, and ion-molecule chemistry experiments.

Currently, the ID-CIMS technique has sufficient sensitivity for laboratory studies of mercury chemistry, and I will demonstrate how it can be used to shed light on the gas-phase oxidation of elemental mercury and gas-surface reactions of oxidized mercury.

I will wrap up the talk by describing how the sensitivity of ID-CIMS can be improved to make direct analysis of oxidized mercury in the atmosphere possible.

## **BIO**

Alex received his undergraduate degree in Chemistry from Bashkir State University (Ufa, Russia) in 1994 and his Ph.D. in Physical Chemistry from the Ufa Research Center of the Russian Academy of Sciences in 1997. He started research in Atmospheric Chemistry during his NATO/NSERC Postdoctoral Fellowship at McGill University, where he investigated the oxidation of atmospheric elemental mercury. Later, he studied the optical properties and homogeneous freezing of supercooled water droplets as a Research Associate at the University of Waterloo and the formation and impacts of atmospheric aerosols as an Assistant Research Scientist at Texas A&M University. The central aim of his current research is to understand the chemical transformations and environmental impacts of atmospheric pollutants, including aerosol nanoparticles and mercury.

### **Committee members:**

**Professor Pier Champagne – [pier.a.champagne@njit.edu](mailto:pier.a.champagne@njit.edu)**

**Professor Farnaz Shakib – [farnaz.a.shakib@njit.edu](mailto:farnaz.a.shakib@njit.edu)**