

2024
Maryland
Chemist
Award
Lecture

Tuesday,
April 1, 2025



20 Pine Street
Baltimore, MD 21201

6:00 P.M.

RSVP

Beatrice Salazar
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MAP
Garage

An Invitation

To celebrate the recognition of the
2024 Maryland Chemist of the Year

Sarah L. J. Michel



Dean and Professor of Pharmaceutical Sciences
University of Maryland School of Pharmacy

Metals in Biology: From Zinc Fingers to Iron Nanomedicines to Electronic Cigarettes: Metals play important roles in biology and human physiology, where they have both beneficial and detrimental effects. Our laboratory works on metals from a fundamental and translational perspective, and I will present a series of vignettes highlighting work in these areas. One beneficial role of metals is serving as a co-factor for proteins. Here, zinc is one of the most common metals that serves as a protein co-factor, and it can be found in enzymes and structural proteins. Structural zinc proteins, called Zinc Finger proteins (ZFs), are among the most abundant proteins in eukaryotes, making up to 10% of all proteins. ZFs have critically important roles in modulating transcription and translation and exhibit a remarkable capacity for highly selective nucleic acid recognition. Our work on a variety of ZFs that regulate DNA and RNA, including one with an unexpected iron-sulfur co-factor, will be presented. I will also describe a recent discovery that cysteine residues of ZFs are modified by H₂S, a gaseous signaling molecule. We have discovered that this modification, called persulfidation, is widespread throughout the genome, and affects transcriptional and translational functions. Metals can also be beneficial as drugs to treat diseases. One emerging class of metal-based drugs are iron-nanoparticles to treat iron deficiency anemia. These drugs are complex, making it challenging to replicate them for generic drug approval. We developed a novel bioanalytical approach that couples liquid-chromatography with inductively coupled plasma mass spectrometry to study the fate of iron nanoparticles in a clinical trials. I will describe how of this approach led to changes in FDA guidance. An emerging area of concern involves potentially toxic metals in electronic cigarettes or 'vapes.' I will describe our findings that commercial vapes contain toxic metals, our efforts to aerosolize these products, identify toxic metals in the aerosols, and our work to determine their effects on cells to assess potential harm.

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