

Mercury: Binding, Methylation and Demethylation

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Track: Risk Management, Remediation or Science Policy

Session: Mercury Characterization and Contaminated Site Remediation: Methods, Challenges, and Lessons Learned

The fate of mercury deposited in the environment depends on the molecular-level physical interactions and chemical reactions, mostly involving mercury interacting with water, various ligands, and proteins. Using the tools of molecular biophysics and computational chemistry we will examine the fundamental underpinnings of several environmentally-important mercury transformations. Mercury (II) preferentially binds to thiol groups; we will examine why this is the case (the traditional explanation fails here). We will also outline how chemical concepts guided our recent discovery of the bacterial genes responsible for producing toxic methylmercury in the environment [1]. Finally, mechanisms used by proteins to detoxify methylmercury mercury-resistant bacteria will be explored [2, 3].

[1] Parks et al., Science 339 (6125) 1332-1335 (2013)

[2] Johs et al., J. Mol. Biol. 413(3):639-56 (2011); Guo et al J. Mol. Biol 398 555-68 (2010).

[3] Parks et al., J. Am. Chem. Soc. 131, 13278- 13285 (2009)