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Characterizing Phosphorus in Agriculture and the Environment at the Nanoscale

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Characterizing Phosphorus in Agriculture and the Environment at the Nanoscale

Phosphorus (P) is a key nutrient in fertilizers. Yet it is sourced from non-renewable resources, is inefficiently utilized, and accumulates in terrestrial systems such as soils and freshwater resources, causing harmful algal blooms and fish kills. Advanced characterization techniques are needed to understand the cycle of P in the environment, the various forms in which it exists, and to facilitate its recovery and reuse as recycled fertilizers. This talk will introduce our work to advance the characterization techniques underpinning the identification and characterization of inorganic and organic phosphorus compounds using X-ray scattering and microscopy tools including but not limited to electron energy loss spectroscopy (EELS) in the transmission electron microscope and extended X-ray absorption fine structure (EXAFS). We will also introduce a recently-funded NSF Science and Technology Center, the Science and Technologies for Phosphorus Sustainability (STEPS) Center. STEPS is a convergence research center that addresses challenges in phosphorus sustainability by integrating disciplinary contributions across the physical, life, social, and economic sciences.

Primary authors: JONES, Jacob (North Carolina State University); Ms TRUBCHANINOV, Elizabeth (NC State University)

Presenter: JONES, Jacob (North Carolina State University)

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