Polymer Program

INSTITUTE OF MATERIALS SCIENCE

Seminar: 11:10 am Friday, April 19, 2024

Science 1: Room 1002

Host: Jeff McCutcheon

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From Nanocellulose Technologies to New Circular Solutions for Agriculture

Abstract:Current farming practices create a broken nutrient loop, where most nutrients are lost into our environment or left behind in agriculture residues, and animal and food waste, creating multiple pollution problems. In this talk, we demonstrate a new approach that can close the nutrient cycle using zero-waste nitro-oxidation processing (NOP) technologies, capable of rapidly upcycling natural organic waste into reproducible, sustainable, and safe fertilizers, growing media, soil amendments and biogels for farming. In brief, NOP can extract all nutrients (nitrogen (N), phosphorus (P), potassium (K), macro- and micro-nutrients) from organic feedstocks in a few hours, neutralizing the effluent into safe and effective fertilizers, sterilizing all harmful human pathogens, while producing no odor nor greenhouse gases. Furthermore, NOP can prepare anionic nanocellulose scaffold that can be ionically cross-linked into stable but biodegradable biogels using essential metal ions (macro- and micronutrient) for plant growth. These NOP-derived biogels can be used as effective additives to improve the water hold capacity of fibrous substrates and soils, or as standalone growing media.

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