UNIVERSITY OF CALIFORNIA
UC RIVERSIDE | Materials Science and Engineering

WINTER 2020 COLLOQUIUM SPEAKER

Nano-enabled and Responsive Platforms for Atom Efficient Agrochemical Delivery in Plants

Engineered nanomaterials have the potential to revolutionize agrochemical delivery, efficacy, and use efficiency, and to improve the sustainability of agriculture. We assessed the importance of nanomaterial properties, including charge, size, composition, and coating hydrophobicity to promote efficient uptake and translocation of engineered nanomaterials in plants after foliar and root exposures. Spatially resolved synchrotron X-ray imaging tools demonstrated that coating hydrophobicity controls both route and extent of nanoparticle uptake across the plant leaf cuticle for foliar applied nanomaterials, and the ease of transport through leaf mesophyll into the plant vasculature. NP size up to 50nm did not influence NP uptake through the cuticle, but size did influence their leaf-to-root transport and root exudation. Selected NP coatings can also target NPs to specific leaf features like stomata guard cells. Finally, we have developed a temperature-responsive star polymer that can release active ingredients in vivo under heat stress. Overall, the body of evidence indicates great potential for manipulating nanomaterial properties for beneficial applications in agriculture and for increasing agrochemical utilization efficiency and sustainability of food production.

MARCH 11, 2020 | WINSTON CHUNG HALL 205/206 | 1 PM - 2 PM

Dr. Gregory Lowry

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Greg Lowry is the Walter J. Blenko, Sr. Professor of Civil and Environmental Engineering at Carnegie Mellon University. He is the Deputy Director of the NSF/EPA Center for Environmental Implications of Nanotechnology (CEINT), and an Executive/Associate Editor of Environmental Science & Technology. His research aims to harness the unique properties of engineered nanomaterials for making crop agriculture, water treatment, and environmental remediation more sustainable. He has authored more than 170 peer-reviewed journal articles (H index=72) and one book. He served on the board of directors of the Association of Environmental Engineering and Science Professors, and on the US EPA Science Advisory Board (Environmental Engineering committee). He is a Board-Certified Environmental Engineer (BCEEM), Fellow of the American Association for the Advancement of Science, and was a member of the National Academy of Science Committee on Science Breakthroughs 2030: A Strategy for Food and Agricultural Research. Dr. Lowry holds a B.S. in Chemical Engineering from the University of California at Davis, an M.S. from the University of Wisconsin at Madison, and a Ph.D. in Civil & Environmental Engineering from Stanford University.

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