RESEARCH FOCUS ON DR. MOHAMMED BAALOUSHA

Engineered nanoparticles are currently considered as an emerging contaminant because their increased production and use in consumer products leads to release into the environment and some of them have been shown to be toxic. Risk assessment of nanotechnology to humans or the environment, resulting from increased accumulations of engineered nanoparticles in aquatic systems, is currently impeded by the difficulty in differentiating engineered nanoparticles from naturally occurring nanoparticles and quantifying engineered nanoparticle exposure concentrations and properties. This CAREER award aims to develop methods to discern engineered and natural nanoparticles and to measure the concentration and properties of engineered nanoparticles in the natural environment.

Dr. Mohammed Baalousha from the University of South Carolina and his team will use his CAREER award to develop a multi-method analytical platform capable of discerning engineered

PROJECT TITLE
NSF CAREER: Detection and quantification of metal-based engineered nanoparticles in surface waters

AIM
The outcomes of this research will impact other disciplines such as aquatic toxicology and environmental nanoscience and engineering. It will also inform federal agencies (e.g. EPA, NIST, and USGS) and industry on nanoparticle regulation and best safety practices.

AWARD ABSTRACT
https://www.nsf.gov/awardsearch/showAward?AWD_ID=1553909

CONTACT US
SC EPSCoR/IDeA Program
1000 Catawba Street, Columbia, SC 29201
scepscoridea.org

nanoparticles from natural nanoparticles based on differences in their physicochemical properties such as size, morphology, chemical composition, elemental/isotopic ratios, and/or combinations of these properties. "We hypothesize that engineered nanoparticles possess significantly different physicochemical properties, relative to natural nanoparticles, which will enable detection and quantification engineered nanoparticles in complex matrices," said Baalousha. "The multi-method approach includes field flow fractionation coupled with inductively coupled plasma-mass spectroscopy, single particle-ICP-MS and transmission electron microscopy coupled with X-ray energy dispersive spectroscopy techniques and methodologies. In particular, we will evaluate the capability of these methods to identify subtle differences in physicochemical properties of engineered versus natural nanoparticles to enable detection and quantification of engineered nanoparticles, 2) determine applicability and limitations of these methods for engineered nanoparticle analysis in surface waters, 3) perform analysis of engineered nanoparticles in surface waters receiving effluents from waste treatment plants, and 4) apply the multi-method approach for monitoring of engineered nanoparticles in surface waters in collaboration with the USGS."

To integrate research, education and service, Baalousha will: 1) develop undergraduate and graduate lectures and courses in environmental nanoscience, 2) edit books that can be used as text book material, 3) enhance undergraduate, graduate, and high school laboratory and field experiences, 4) develop a professional training program for high school teachers, 5) enhance high school students awareness of nanotechnology and the opportunities and challenges it may offer, 6) training students on reviewing proposals, 7) involving students in grants development and writing, and 7) organize the FFF2018 symposium, and a meeting and discussion of high school student with international researchers.

Dr. Mohammed Baalousha
Assistant Professor
University of South Carolina
Arnold School of Public Health
(803) 777-7177
mbaalous@mailbox.sc.edu
https://www.sc.edu/study/colleges_schools/public_health/faculty-staff/baalousha_mohammed.php

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