Topic: Aquatic ecotoxicology and environmental risk assessment

Type of presentation: Oral

Humic acids and nanoparticle size change the toxicity of nano CuO to freshwater microbes and invertebrates

Arunava Pradhan, Paulo Geraldes, Seena Sahadevan, Cláudia Pascoal, Fernanda Cássio

Centre of Molecular and Environmental Biology (CBMA), Department of Biology, University of Minho, Campus de Gualtar, 4710-057 Braga, Portugal

E-mail ID of presenting author: arunava2006molbio@gmail.com

Increased commercial application of metal oxide nanoparticles increases the chance of their exposure to surface waters, generating a potential risk to biota and associated ecological processes. The probable threat however may depend on nanoparticle size and also the interactions with natural organic matter present in water, such as humic substances. In streams, microbes and invertebrate shredders are key players in detritus foodwebs to transfer energy from plant-litter to higher trophic levels. We investigated the impacts of nano CuO size (12, 50 and 80 nm powder) and concentration (up to 400 ppm; 5 levels) and the influence of humic acid (HA ≤100 ppm; 3 levels) on stream-dwelling microbial decomposers and the invertebrate shredder *Allogamus ligonifer*. In the absence of HA, the exposure of microbially-colonised leaves to different sizes of nano CuO reduced leaf decomposition. The effects became more severe as nano CuO concentration increased and nanoparticle size decreased. The exposure of shredders to sublethal concentrations of nano CuO decreased leaf consumption rate and the effects were stronger for nanoparticles with lower size. The exposure to higher concentrations of HA alone reduced leaf decomposition by microbes and leaf consumption by the invertebrate. Conversely, the exposure to HA led to a decrease in nano CuO toxicity, particularly at lower nanoparticle sizes.

FEDER-POFC-COMPETE and FCT supported this study (PEst-C/BIA/UI4050/2011 and PTDC/AAC-AMB/121650/2010), AP (SFRH/BD/45614/2008) and PG (SFRH/BD/75516/2010).