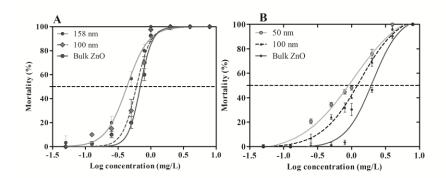
## Acute toxicity and accumulation of ZnO NPs in *Ceriodaphnia dubia*: relative contributions of dissolved ions and particles

M. Bhuvaneshwari<sup>1</sup>, R. Nagarajan<sup>2</sup>, N. Chandrasekaran<sup>1</sup>, Amitava Mukherjee<sup>1</sup>

<sup>1</sup>Centre for Nanobiotechnology, VIT University, Vellore 632014, India

E-mail: amit.mookerjea@gmail.com

Although the ecotoxicological effects of various metal oxide nanoparticles on aquatic organisms is being actively studied, the contributions of particle and dissolved ions towards toxicity are still not well understood. Aquatic crustaceans are common experimental organisms for the assessment of nanoparticle toxicity, due to their filter-feeding behaviour, ability to accumulate metals and sensitivity to environmental pollutants. The current study aims to assess the contribution of ZnO NP<sub>(particle)</sub> and ZnO NP<sub>(ion)</sub> to the overall toxicity and accumulation of ZnO NP<sub>(total)</sub> in *Ceriodaphnia dubia*. The 48 h LC<sub>50</sub> of ZnO NP<sub>(total)</sub> was found to be 0.431, 0.605 and 0.701 mg/L for 50, 100 nm and bulk particles exposure. However LC<sub>50</sub> of Zn<sub>(ion)</sub> was found to be 1.048, 1.343 and 2.046 mg/L for dissolved ions from different sizes (50 nm, 100 nm, and bulk) of ZnO particles. At LC<sub>50</sub> concentration, the accumulation of 90-95% was noted for the NP<sub>(particles)</sub> across the sizes employed, while only about 4-5% contribution was from the NP<sub>(ion)</sub> to the overall accumulation NP<sub>(total)</sub>. The accumulation of ZnO NPs also revealed, ZnO NP<sub>(particles)</sub> were predominately accumulated into daphnids gut than that of ZnO NP<sub>(ion)</sub>. The relative contribution of ZnO NP<sub>(ion)</sub> to overall toxicity and accumulation was found to be lesser than that of ZnO NP<sub>(particles)</sub> across the sizes used in the study.



<sup>&</sup>lt;sup>2</sup>Department of Chemical Engineering, IIT Madras, India