

Comparison of the environmental impact of carbon nanoparticles (carbon nanotubes, nanodiamonds, few-layer graphene)

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Carbon nanoparticles have exceptional properties and already used in numerous industrial applications. For this reason, we expect that they may ultimately get into the environment along their life cycle (from production to end of life of goods including them), and especially in the water. This work deals with the ecotoxicological assessment of different carbon nanoparticles (CNPs) in the aquatic compartment by comparing the effects of different nanocarbons: Carbon Nanotubes (CNTs: double-walled and multiwalled), few-layer graphene (FLG), and nanodiamonds (ND), using the ISO 21427-1 biotoxicity assay on *Xenopus laevis* larvae.

Three different endpoints were investigated after 12 days of exposure: (i) acute toxicity (mortality), (ii) chronic toxicity (growth inhibition) and (ii) genetic toxicity (micronucleus assay). Beside toxicity bioassays, a complete characterization of nanocarbons was undertaken.

Neither mortality nor genotoxicity was observed regardless of these types of nanocarbons. Only growth inhibition was observed and depended on the nature of the nanocarbon. Growth inhibition expressed using three different metrics (mg.L^{-1} ; number of particles. mL^{-1} and surface area in m^2) showed that the toxicity of the investigated nanocarbons seems to depend mainly on the total surface area of the nanoparticles. Furthermore, we hypothesize that toxicity observed in larvae exposed to high concentrations of nanocarbons would be limited to physical effects (gill clogging and/or abrasive effects and or nutrients deprivation).