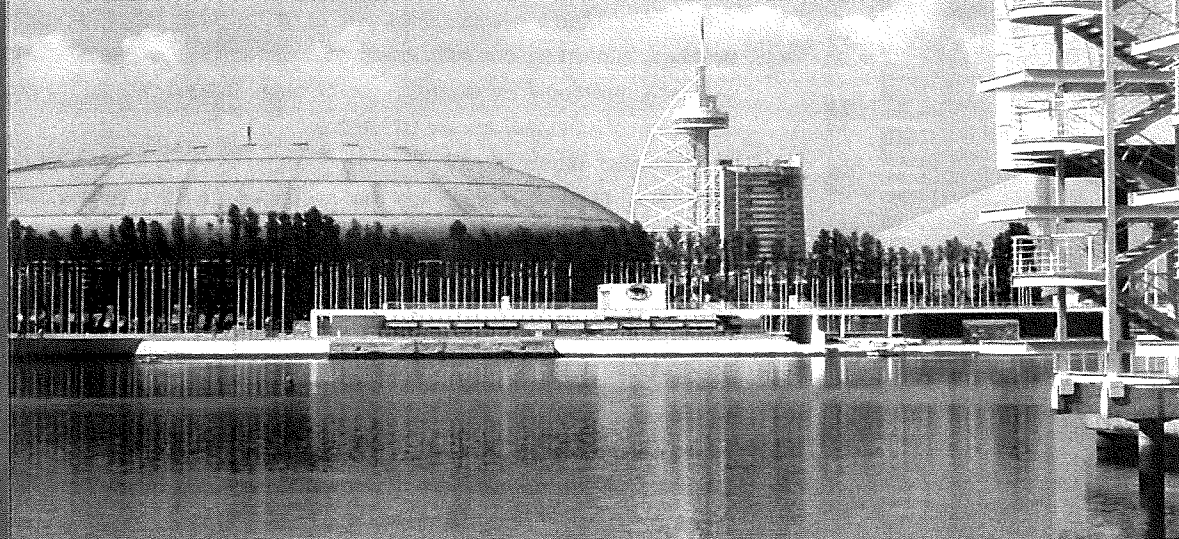




ICNMTA 2012

13th International Conference on Nuclear Microprobe Technology & Applications

Lisbon, Portugal 22-27 July



Book of Abstracts

Conference Organizers:
IST/ITN, CFNUL, FCT/UNL, SPF
in cooperation with IAEA

**Nuclear Microscopy as a tool in nano TiO₂ Bioaccumulation Studies
in aquatic species**

T. Pinheiro¹, L. Moita², L. Silva², E. Mendonça², A. Picado²

¹IST/ITN, Universidade Técnica de Lisboa & Centro de Física Nuclear FFCUL, Portugal

²LNEG, Laboratório Nacional de Energia e Geologia, I.P. Estrada do Paço do Lumiar 22,
1649-038 Lisboa, Portugal

Engineered Titania nanoparticles are used for wide range of applications from coatings, sunscreen cosmetic additives to solar cells or water treatment agents. Inevitably environmental exposure can be expected and data on the ecotoxicological evaluation of nanoparticles are still scarce.

The potential effects of nano titanium dioxide (TiO₂) on two model organisms, the water flea, *Daphnia magna* and the duckweed *Lemna minor*, were examined in semichronic toxicity tests.

Daphnia and *Lemna* were exposed to TiO₂ nanoparticles (average particle size value of 27.6±11 nm (n=42); concentration range, 1.4 mg/L to 90 mg/L) by dietary route and growth in medium containing the nanoparticles of TiO₂, respectively. Morphology and microdistribution of TiO₂ in the individuals was examined by nuclear microscopy techniques.

A significant amount of TiO₂ was found accumulated in *Daphnia* exposed to nanoparticle. Nuclear microscopy imaging revealed that Ti was localized only in the digestive tract of the *Daphnia*, which displayed difficulty in eliminating the nanoparticles from their body. *Daphnia* showed higher mortality when exposed to higher concentrations of TiO₂ (> 10 mg/L).

The exposure to TiO₂ nanoparticles above 25 mg/L caused morphological alterations in *Lemna*. The roots became stiff and leaves colourless. The Ti mapping of cross-sections of roots and leaves showed that Ti was mainly deposited in the external cuticle of the leaves and in external root tissues, with minor internalization.

In summary, exposure of aquatic organisms to TiO₂ nanoparticles may alter the physiology of these organisms at individual and population levels, posing risks to aquatic ecosystems.

Project funded by Fundação para a Ciência e Tecnologia, PTDC/CTM/099446/2008.