Toxicological profile assessment of ENMS for polymer industry in the context of NanoDesk SUDOE project

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New developments have arisen based on the use of the nanotechnology, which brings innovative opportunities to the plastic industry, enabling the development of materials with new functional properties.[1, 2]
The incorporation of nanofillers opens an opportunity for developing innovative and high performance of polymer based materials (volume and surface properties; dimensional and chemical stability; photocatalytic, optical, electrical and thermal properties, among others). However, nanoparticles (NPs) can be dangerous due to its own toxicity, or because of the toxicity derived from the molecules that functionalize it. Therefore, it is necessary to ensure that the ENMs use does not pose risks to health or the environment.[3]
In this context, the main objective of the NanoDesk project is to promote nanotechnology as key enabling technology to develop novel added value plastic materials based on the use of engineered nanomaterials (ENMs). The project addresses current barriers limiting the use of ENMs by the development of tools to support decision making, including applications to identify proper nanofillers for targeted applications, advanced browsers to improve the access to information on applications and safety issues, on line tools to characterize the toxicological profile and exposure potential to relevant nanomaterials, as well a complete observatory on the safety and applications of nanostructured polymers.
We define the toxicological profile of the selected ENMs (metal nanoparticles and metal oxides, carbon based materials, nanoclays). To assess ecotoxicological impact, we performed acute toxicity assays with *Daphnia magna*, using immobilization (EC_{50}) as toxicological endpoint. For the toxicity assessment, we performed MTT Proliferation Assay to study ENMs cytotoxicity (cellular damage), and the Comet Assay in the case of genotoxicity (DNA damage). In both procedures, two types of cell lines were used: the adenocarcinomic human alveolar basal epithelial cells A549; and the spontaneously immortalized aneuploid human keratinocyte cell line HaCaT.

References

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Figures

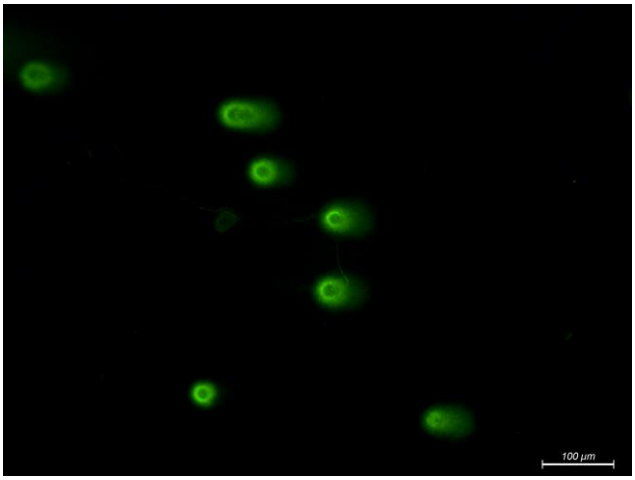

Figure 1: Fluorescence Microscopy (LAS CORE™, LEICA Microsistems) image example: TiO^2 studied nanoparticle by Comet Assay. Long comet tails extending toward the anode were observed as an indicator of DNA damage.