

Secondary True to Life Polyethylene Terephthalate Nanoplastics: Obtention, Characterization, and Hazard Evaluation

Authors : Aliro Villacorta, Laura Rubio, Mohamed Alaraby, Montserrat López Mesas, Victor Fuentes-Cebrian, Oscar H. Moriones, Ricard Marcos, Alba Hernández.

Abstract : Micro and nano plastics (MNPLs) are emergent environmental pollutants requiring urgent information on their potential risks to human health. One of the problems associated with the evaluation of their undesirable effects is the lack of real samples matching those resulting from the environmental degradation of plastic wastes. To such end, we propose an easy method to obtain polyethylene terephthalate nano plastics from water plastic bottles (PET-NPLs) but, in principle, applicable to any other plastic goods sources. An extensive characterization indicates that the proposed process produces uniform samples of PET-NPLs of around 100 nm, as determined by using a multi-angle and dynamic light scattering methodology. An important point to be highlighted is that to avoid the metal contamination resulting from methods using metal blades/burrs for milling, trituration, or sanding, we propose to use diamond burrs to produce metal-free samples. To visualize the toxicological profile of the produced PET-NPLs, we have evaluated their ability to be internalized by cells, their cytotoxicity, and their ability to induce oxidative stress and induce DNA damage. In this preliminary approach, we have detected their cellular uptake, but without the induction of significant biological effects. Thus, no relevant increases in toxicity, reactive oxygen species (ROS) induction, or DNA damage -as detected with the comet assay- have been observed. The use of real samples, as produced in this study, will generate relevant data in the discussion about the potential health risks associated with MNPLs exposures.

Keywords : nanoplastics, polyethylene terephthalate, physicochemical characterization, cell uptake, cytotoxicity

Conference Title : ICNN 2023 : International Conference on Nanoscience and Nanotechnology

Conference Location : Rome, Italy

Conference Dates : March 06-07, 2023