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Approach for Human Toxicity and Freshwater Ecotoxicity midpoints determination for their inclusion in Life Cycle Assessment of nanotechnology-based products

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Abstract: The increasing use of nano-enabled products has brought controversy due to the lack of data on their potential impact on human health and environment. On that concern, there is a consensus that Life Cycle Assessment (LCA) is a suitable method to assess the environmental performance of this new technology, although LCA for nanotechnologies is challenging since there are a lot of uncertainties and data gaps and it is necessary to adapt some of the methodologies to determine the impacts of released nanomaterials. The NanoPolyTox project was designed to fill in some of these data gaps for nanocomposite applications, specifically focusing on the determination of Human Toxicity (HT) and Freshwater Ecotoxicity (FE), which contribute to damage on Human Health and on Ecosystems respectively.
An approach for the determination of HT and FE impact characterization factors of released nanomaterials and their application on the evaluation of the environmental impacts of three polymeric nanocomposites for outdoors applications (MWCNT-PP, , TiO2-PA, ZnO-EVA) will be presented. This approach is based on a combination of release quantification over the different life-cycle stages (including use phase simulations and end-of-life treatments), fate modeling (using USEtox® as a starting point) and (eco)toxicity studies.

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