

Challenges to the evaluation of the emerging risks concerning Nanocomposites – LightMe case study

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LightMe is a European research project that will aspire to be a point of reference for boosting innovation for the introduction of new functionalities, features and capabilities in the field of lightweight metal matrix nanocomposites. The results are innovative nano reinforced metal matrix composites, produced by Casting methods, Additive Manufacturing and Spark Plasma Sintering, exhibiting advance properties and/or multifunctionality.

The properties of nanomaterials (NMs) differ from those of their micro and macro homologous substances (bulk). These differences result from the specific physical and chemical characteristics of NMs, and which will lead to the uncertainties regarding their behaviour when interacting with the human body or the environment. Whilst NMs are becoming a promising application and has the potential to grow much more, their associated health and environmental risks still remain far from being known.

In this presentation, we will explore the latest developments in the field of risk assessment for nanocomposites, including the legal and standardisation frameworks linked to their production and use, with the aim to clarify the current knowledge on nanosafety aspects. Using the LightMe project as a case study, we also intend to highlight the challenges arising from the lack of data on hazards and the subsequent risks within the scope of this emerging technology and contribute to research and propose solutions to overcome them.

Whilst the fundamental approach to conducting risk assessment (RA) of emerging technologies, such as nanocomposites, is similar to that of existing technologies, the former pose additional challenges. For

example, NMs as any chemical, are regulated by the registration evaluation authorization and restriction of chemicals (REACH) which require a chemical safety assessment (CSA) [1]. However, key information required for this process, such as dose-response data for the hazard identification, is in many cases inexistent [2]. This is because, in most cases, existing test guidelines and guidance documents applied to bulk materials need to be adapted. Some international bodies (ISO, OECD, ECHA) are working on to provide more generalized guidance, but there are still issues related onto how to adapt standards and guidelines to the unique properties of NMs and their sectors of application [3].

Specifically, within the LightMe project will be carried out monitoring activities at distinct industrial scenarios (particle concentration and size distribution), exposure assessment analyses that will determine the release, and transfer to receptor of MNs, and analysis/application of RA tools in order to overcome the current lack of information for determining the hazards and levels of exposure to health and environment.

The LightMe project aim to produce recommendations to improve key guidance, regarding chemical safety and exposure assessment of NMs, applicable to the industrial sector and to comply with regulations (e.g. REACH).

References

- [1] REACHnano Consortium (2015) technical guidances
- [2] Williams, R. A. et al (2010) Risk Analysis: An International Journal, 30(11),1671-79
- [3] Jeevanandam, J., et al (2018) Beilstein Journal of Nanotechnology, 9(1),1050-74