the fate of nanomaterials.

Teresa Castelo-Grande1,*, Paulo A Augusto1,2, Domingos Barbosa1

[1] LEPABE – Laboratory for Process Engineering, Environment, Biotechnology and Energy, Faculty of Engineering, University of Porto, Rua Dr. Roberto Frias, 4200-465 Porto, Portugal;

[2] APLICAMA - Research Group, Departamento de Ingeniería Química y Textil, Facultad de Ciencias Químicas, Universidad de Salamanca, Plaza de los Caídos 1-5, 37008 Salamanca, Spain

(*) castelogrande@sapo.pt

Nanoscience is one of the most newsworthy research and development area in modern science and industry. Today's manufacturing and application of nanomaterials in a wide range of areas bring specific issues related to handling of waste containing nanomaterials. The outbreak that has occurred in the proliferation of so many different engineered nanomaterials' (ENM) creates today a big issue to regulators in what concerns hazard identification and environmental/ health legislation [1]. Although the majority of the scientific community is yet unwilling to talk about it, is of the upmost importance to highlight problems related to uncontrolled release of nanoparticles to the environment through waste disposal, and to introduce the topics of nanowaste and toxicology of nanoparticles into the waste management. Some studies associated with usage, precautions, safety and risk perceptions related to ENM were made in some companies [2], and the results suggest that there is insufficient information to establish specific regulations.

In order to evaluate the risks inflicted by the use of nanomaterials in commercial products, and even more important, in environmental applications, is urgent to understand their mobility, bioavailability, and ecotoxicity [3]. The main concern of ENM lies in their toxicology and in the astonishing level of ENM production in the world that leads to an increasing debate on their effects on human occupational settings and on the environment. As a consequence of the increasing production of NMs of all types and the potential for their release in the environment, their toxicity needs to be addressed. In doing so, it is necessary first to determine the fate and behavior of manufactured NMs in the environment. However, the mechanism of toxicity is still unclear and biocompatibility varies depending on numerous parameters, such as nanoparticle size and shape, surface properties, applied nanoparticle concentration, type of cell and nanomaterial. The toxicity of nanomaterials is often linked to their extremely small size; smaller particles have a greater reactive surface area and are more chemically reactive and produce greater numbers of reactive species, including free radicals [4]. Their high chemical reactivity and their greater capacity to penetrate biological membranes also pose serious new toxicity risks. There are now on the global market over 720 products that contain nanomaterials.

Is urgent to wake-up for this new problem, that although with very small visibility (nano size), it will become very quickly a huge problem if we don't take the necessary attention.

The present work is a review of scientific results on the fate and potential negative impact of engineered nanoparticles on the environment.