Contribution ID: **14** Type: **not specified**

Dynamic Probabilistic Modelling of Environmental Emissions of Engineered Nanomaterials

Monday, 9 March 2015 17:50 (20 minutes)

Currently little is known about engineered nanomaterial (ENM) concentrations in the environment. In 2009, we reported the first environmental concentrations for different ENM by applying probabilistic material flow modelling, which was recently updated to yield more comprehensive and up-to-date environmental concentrations of ENM. However, the used models are static and do not consider time-dependent processes. We present here results from a dynamic model that advances the estimation of environmental emissions and concentrations in two ways: first, instead of considering only one yearâ•´s input and distribution, it takes a realistic time frame as the temporal boundary of the system and tracks the flows over many years. Second, rather than simply assuming that all ENM are released to waste streams and environmental compartments in the same year when they entered the system, time dependent ENM release from products are taken into account. This presentation focuses on the first results obtained for nano-TiO2, nano-ZnO, nano-Ag and CNTs. We combined the available information of ENM input, product life-time and release dynamics and were able to predict â•¿realâ•¯ environmental emissions and concentrations of ENM, especially the accumulated ENM concentration in sinks such as soils and sediments.

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Session Classification: 2B Environmental exposure, release & fate

Track Classification: Parallel session 2B: Environmental exposure, release & fate