

Meeting the Needs for Released Nanomaterials Required for Further Testing—The SUN Approach - DTU Orbit (08/11/2017)

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The analysis of the potential risks of engineered nanomaterials (ENM) has so far been almost exclusively focused on the pristine, as-produced particles. However, when considering a life-cycle perspective, it is clear that ENM released from genuine products during manufacturing, use, and disposal is far more relevant. Research on the release of materials from nanoproducts is growing and the next necessary step is to investigate the behavior and effects of these released materials in the environment and on humans. Therefore, sufficient amounts of released materials need to be available for further testing. In addition, ENM-free reference materials are needed since many processes not only release ENM but also nanosized fragments from the ENM-containing matrix that may interfere with further tests. The SUN consortium (Project on "Sustainable Nanotechnologies", EU seventh Framework funding) uses methods to characterize and quantify nanomaterials released from composite samples that are exposed to environmental stressors. Here we describe an approach to provide materials in hundreds of gram quantities mimicking actual released materials from coatings and polymer nanocomposites by producing what is called "fragmented products" (FP). These FP can further be exposed to environmental conditions (e.g., humidity, light) to produce "weathered fragmented products" (WFP) or can be subjected to a further size fractionation to isolate "sieved fragmented products" (SFP) that are representative for inhalation studies. In this perspective we describe the approach, and the used methods to obtain released materials in amounts large enough to be suitable for further fate and (eco)toxicity testing. We present a case study (nanoparticulate organic pigment in polypropylene) to show exemplarily the procedures used to produce the FP. We present some characterization data of the FP and discuss critically the further potential and the usefulness of the approach we developed.

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