

Handling of Nanomaterials at Molecular Toxicology

➤ When engineered nanomaterials in powder-form are purchased or provided by our collaborators in other laboratories, they arrive in small, properly sealed bottles. These bottles are registered within our Unit, organized and kept in a ventilated drawer for chemicals until further use.

➤ Importantly, all handling of nanomaterials in powder-form occurs in the specially designated **glove box** [right]. The well described instruction for use of glove box is kept in the drawer close to the glove box (room C3-313). The handling of nanomaterials in the glove box includes:



• **Opening of the bottles of nanopowders.** When opening or reopening containers holding dry nanoparticles it is necessary to cover the surface of the glove box surrounding the container with a damp towel/tissue. This is necessary to restrict any free nanoparticle that floats off the container while opening from reaching undesirable parts of the containment unit. This damp towel/tissue can then be discarded after the nanoparticles are weighed and suspended in desirable media.

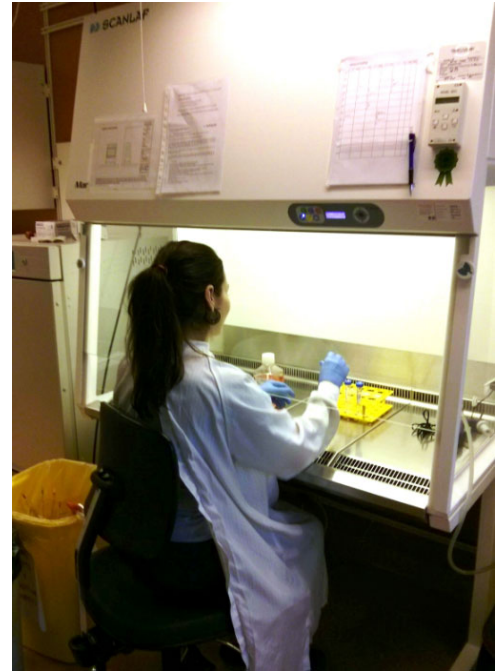
• **Weighing and solving nanopowders in liquid solvent.** The nanopowders are weighed with an anti-static spatula that considerably helps to reduce the risk of contaminations.

• **Termination.** After weighing and desolving nanomaterial in liquid, sample tubes and bottles are well sealed, wiped clean by ethanol and water in the glove box them. All damp towel/tissue, tips and tubes used for weighing and cleaning are collected in a plastic bag, sealed well. Finally, before opening and transferring anything out of the glove box, the blower of the glove box stays on for 1 min.



➤ No release of nano-materials to the environment is allowed in the glove box. The residual dust of nanomaterials is collected in special filter in glove box and the filter is replaced by new one within reasonable time periods. The contaminated filters are sent for incineration.

- Application of the nanomaterials in suitable dispersions into cell cultures occurs in the **LAF-benches** in the cell lab [right]. When handling nanomaterials, all personnel wear standard personal protection, i.e., lab coat, mouth protection, and gloves that cover the skin below the cuff of the lab coat (in order to protect both airways and skin).
- After application of nanomaterials in cell culture, the contaminated liquid and plastic ware and other solid wastes are collected in labeled and sealed containers, and send for incineration. The instruction for waste handling is well visibly attached on the wall of the cell culture lab.
- If by accident a powder is spilled, the material is wiped up using damp cloths and/or wetting the powder prior to dry wiping. Cleaning tissues are disposed as chemical waste.
- The document “General Safe Practices for Working with Engineered Nanomaterials in Research Laboratories” (2012), and the accompanying document “Current Strategies for Engineering Controls in Nanomaterial Production and Downstream Handling Processes” (2014) produced by the National Institute for Occupational Safety and Health (NIOSH), identify and describe strategies for the engineering control of worker exposure, including workers in research laboratories, during the production or use of engineered nanomaterials. Both documents are printed and available for the personnel at the Unit. More information on safe handling of engineered nanomaterials can be found at the website (<http://www.cdc.gov/niosh/>) and on the website of the EU-funded project NANOSAFE (<http://www.nanosafe.org>; see dissemination reports).



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