Workpage WP E: Experimental

Lead: TU Dresden

Aim of the WP E is to collect experimental data on the human exposure to atomized MNM, because spraying of MNM suspensions is the most important way of exposure to MNM. A test rig will be developed which enables for the stable and reproducible generation of aerosols from MNM suspended in various liquids under different conditions. The test rig for the characterization of aerosols from spray processes will employ a flow channel and a nozzle for atomizing liquids containing MNM. To simulate practical relevant spray scenarios an impaction plate will be installed in the flow channel. The aerosol which bypasses this impaction plate will be sampled for the measurement of its size distribution and used for cell culture exposure. Optionally an electrostatic classifier (DMA) or a cascade impactor will be employed to use defined particle size fractions for subsequent exposure and for the size selective preparation of the particles on SEM/TEM-grids.

Samples of cell models (monolyer cultures, human 3D airway models and PCLS) will be exposed for assessing particle size distribution in the chemical surrounding of an airway epithelium, and additionally for measurement of the intracellular dose. Cultivation of human 3D airway models as well as chemical and particle analysis will be performed by BfR and Gaiker. Analysis will deliver the MNM content of different size fractions of spray aerosols and the influence of the different chemical surroundings of monolayer alveolar and bronchial cultures, human 3D airway epithelium and textiles on particle size distribution. Analysis of the airway models will further reveal MNM amount occurring at the cellular surface/within the cellular membrane and within the cell.