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Evaluation of nano exposure models

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A previously developed conceptual model (Schneider et al., 2011) offers a framework to describe the processes that affect the emission (at the source) and the fate of manufactured nanoparticles during transport to the receptor. This model was used to critically review available models for estimating occupational and consumer exposure and their applicability for exposure to NOAA. A selection of these models (ART and Stoffenmanager Nano) was additionally evaluated by using existing exposure data to test the relative performance. Measurement data from various exposure scenarios with Al2O3, SiO2, and TiO2 measured with the SMPS and APS were selected based on data availability and data quality. Correlation between model estimations and (metric converted) measured concentrations were calculated using both Spearman and Pearson correlation. For two of the three substances tested in this performance check, the ART estimations fit good. Also the Stoffenmanager Nano showed a trend matching the measurement data for the same substances. It is strongly advised to expand this performance check to more activities and thus more variation in exposure concentrations, but also to other exposure estimation tools.

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