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Deposition ice nucleation on various metal oxide particles

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Deposition ice nucleation on lead, copper and silver oxides has been studied both experimentally and theoretically. Experimental data of activated fractions of PbO, PbO_2, CuO, CuO_2, and Ag_2O particles were measured as a function of ice supersaturation and temperature using the SPIN instrument at temperatures between 228 and 252 K. The main motivation for choosing to study the metal oxide particles is their chemical and physical homogeneity. Experimental ice nucleation data on atmospherically relevant particle types often contain features which might be explained by different types of external heterogeneities within the particle population (i.e. variations in particle chemical compositions or morphologies), or by chemical or physical heterogeneities of individual particles. Therefore, comparison of the metal oxide deposition nucleation data with data from more complex particle types might reveal whether or not various experimental features originate from such heterogeneities. In addition, simple ice nuclei types enable more straightforward comparisons with different ice nucleation theories. Here, we compare the experimental results with the recently developed adsorption nucleation theory, and with the classical nucleation theory. To get input data for the theories, we have measured adsorption isotherms and contact angles of water on the metal oxides.