

Oxidation stability of ice nuclei from plants

Laura Felgitsch, Thomas Häusler, and Hinrich Grothe
TU Wien, Institute of Materials Chemistry, Vienna, Austria

Heterogeneous ice nucleation is an important process in cloud formation and therefore has direct influence on the radiation budget of the Earth. Biological ice nuclei (IN) are highly abundant in nature. Many plants have been found to produce IN. These IN are of special interest, since several have been found to be in a nano-particular/macromolecular size range (Pummer et al. 2015, Felgitsch et al. 2016). Particles of such a small size should show a high lifespan in the atmosphere. Further the substances can easily be attached to mineral dusts. Very little is known about the atmospheric fate of plant derived ice nuclei (IN) in case they become airborne. While they inherit the possibility to influence ice cloud formation, this property depends highly on the expected lifespan of the substance and of its ice nucleation activity in the atmosphere.

For our experiment we exposed plant IN derived from black currant (berry juice) and birch (pollen washing water) to high concentrations of highly oxidative substances typically present in the atmosphere. The exposure lasted several hours and allowed us to monitor the changes in ice nucleation activity. Our results suggest a high stability towards oxidation leading to a high atmospheric life span of the ice nucleation activity if airborne.

Pummer, B.G., Budke, C., Augustin-Bauditz, S., Niedermeier, D., Felgitsch, L., Kampf, C.J., Huber, R.G., Liedl, K.R., Loerting, T., Moschen, T., Schauperl, M., Tollinger, M., Morris, C.E., Wex, H., Grothe, H., Pöschl, U., Koop, T., and Fröhlich-Nowoisky, J.: Ice nucleation by water-soluble macromolecules, *Atmos. Chem. Phys.*, 15, 4077-4091, 2015.

Felgitsch, L., Bichler, M., Häusler, T., Hitztenberger, R., and Grothe, H.: Heterogeneous freezing of water triggered by berry juices from perennial plants, submitted, 2016.