



## Detection and kinetics of protein nitration in aerosols by NO<sub>2</sub> and O<sub>3</sub>

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The effects of air pollution on allergic diseases are not yet well-understood, but recent studies have shown that proteins are efficiently nitrated by polluted air (Franze et al., 2005) and that nitration enhances the allergenic potential of proteins such as the prominent birch pollen allergen Bet v 1 (Grijthuijsen et al., 2006). Accordingly, the nitration of proteins in bioaerosol particles such as pollen and spores by NO<sub>2</sub> and O<sub>3</sub> might be a reason why allergies are on the increase in areas with traffic-related air pollution such as mega-cities and city clusters.

In this study we have developed a method to determine the nitrotyrosine residue number per molecule in nitrated model proteins (bovine serum albumin, BSA; ovalbumin, OVA) by liquid chromatography coupled to UV-Vis photometry and mass spectrometry detectors (LC-DAD and LC-ESI-MS). Nitration experiments were carried out by exposing proteins to synthetic gas mixtures of nitrogen dioxide, ozone, nitrogen, synthetic air and water vapor. Reaction rates were measured at different concentration levels of NO<sub>2</sub> and O<sub>3</sub>, and rate coefficients for the heterogeneous chemical reaction were determined. The implications for atmospheric aging and chemical transformation of bioaerosol particles and their potential effects on public health will be discussed.

### References:

Franze, T., Weller, M.G., Niessner, R., Pöschl, U., Protein nitration by polluted air, *Environ. Sci. Technol.* 39, 1673-1678, 2005.

Grijthuijsen, Y.K., Grieshaber, I., Stöcklinger, A., Tischler, U., Fehrenbach, T., Weller, M.G., Vogel, L., Vieths, S., Pöschl, U., Duschl, A., Nitration enhances the allergenic potential of proteins, *Int. Arch. Allergy Immunol.* 141, 265-275, 2006.