

## ***Interactive comment on “Heterogeneous conversion of NO<sub>2</sub> on secondary organic aerosol surfaces: A possible source of nitrous acid (HONO) in the atmosphere?” by R. Bröske et al.***

### **Anonymous Referee #2**

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Report on " Heterogeneous Conversion of NO<sub>2</sub> on Secondary Organic Aerosol Surfaces : A Possible Source of Nitrous Acid (HONO) in the Atmosphere ? By R. Bröske, J. Kleffmann and P. Wiesen For submission to Atmospheric Chemistry and Physics

This paper examines an interesting hypothesis according to which secondary organic aerosol (SOA) might be responsible for atmospheric HONO formation upon exposure to NO<sub>2</sub>. The sources and origin of HONO are still not clear up to now despite its seminal importance for atmospheric chemistry. This experimental investigation uses two forms of presentation of SOA, namely a filter deposit as well as an aerosol in a slow flowing gas experiment, coupled to sensitive detection of the gas phase, both NO<sub>2</sub> and HONO. This paper presents solid conclusions based on sufficient experiments although the presentation sometimes lacks important details (see below). I recommend publication

in the Journal of Atmospheric Chemistry and Physics (ACP) once the authors will have taken care of the minor points outlined as follows:   
• Introduction: I recommend inserting "potential" before "importance". To my knowledge nobody has claimed that HONO formation from the NO<sub>2</sub>/soot interaction actually IS important! At the end of the section change "decomposition" (of volatile organic) to "reaction" or "oxidation" by the action of O<sub>3</sub> and/or OH. The authors should clarify the sentence "Since the organic fraction of the atmospheric aerosol" to make sure there is no misunderstanding. The authors surely refer either to external mixtures of aerosols or coagulated atmospheric particles. SOA usually does not contain black carbon in its core and occurs as a liquid.   
• Experimental: Did the authors check for the effect of the charcoal denuder on the particle density? Is there a blank experiment to report? Were there any insertion losses?   
• Did the authors perform blank experiments with the PenRay lamp and hydrocarbon alone? How good was the separation between photolysis of H<sub>2</sub>O and potential UV photolysis of the source hydrocarbons? Hard UV radiation ( $\lambda < 200\text{nm}$ ) in air generates ozone such that the separation between the OH and ozone reaction becomes problematic. Would the authors please provide experimental evidence for the absence of ozone or the absence of any photolytic effects on the hydrocarbons?   
• 3.2 Filter experiments. What were the flow characteristics of the slow flow experiments? Flow rate? Gas phase residence time?   
• 3.3 Aerosol flow tube experiment. Why was the LOPAP instrument not protected by an aerosol filter? Any specific reason? What were the flow characteristics of the flow tube? Laminar or turbulent (Reynolds number)?   
• Figure 4 conveys an uncertainty in the HONO concentration of 100 ppt rather than 10 ppt as stated in the text. The precision of the LOPAP instrument is less important than the experimental overall uncertainty given in an experiment and stated by the authors. I recommend using 100ppt for DHONO in equation (2) in order to obtain a limiting value for g.   
• In Figure 1 the connections between elements 1 and 2 are not clear.

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Interactive comment on Atmos. Chem. Phys. Discuss., 3, 597, 2003.

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