

Interactive comment on “Light-induced protein nitration and degradation with HONO emission” by Hannah Meusel et al.

Anonymous Referee #3

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This MS reports on HONO formation resulting (mostly) from the interaction of NO₂ with a particular protein under visible illumination in a flow tube reactor. The HONO released to the gas phase is formed both by photolysis of nitrated tyrosine and a Langmuir-Hinshelwood surface reaction involving NO₂ uptake; this latter process forms HONO even in the dark. For both dark and illuminated channels, there is a positive dependence on RH which suggests that water is involved somehow, although this may be by changing the protein surface morphology rather than as a chemical promoter.

The experiments are well constructed and the results are of some interest. I do have a few comments for the authors' consideration, however:

1. page 5, lines 28-29: I am not convinced that you have demonstrated nitration with the very small signal reported.

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2. page 6, lines 3-5: Again, this is one possible inference, but is certainly not conclusively shown!

3. page 6, section 3.2.1: this experiment is very poorly described - please explain exactly what was done.

4. Page 6, line 32-33: Could this be related to the photodecomposition of the protein, reposted above?

5. Sections 3.2.2 and 3.2.3: Brigante et al (J. Phys. Chem. A 2008, 112, 9503–9508) made these same observations.

6. Page 8, line 19-20: On what basis do you claim that nitration / reaction takes place below the surface layer?

7. page 8, line 28, ff: Brigante et al (2008) also saw no RH dependence for NO₂/HONO on solid pyrene.

8. page 10, Eq. 1 and kinetic arguments: Why is the desorption reaction not included here? The implication of the L-H mechanism, suggested in Fig 5, is that this should be important. The kinetic scheme should reflect this, I think.

9. page 11, lines 17-23: This paragraph seems out of place here; perhaps in the Conclusions? In its place - can the authors in any way (semi)quantify their suggestion that HONO production via NO₂/protein interactions could be atmospherically important?

10. The figure captions are not very descriptive. They should be rewritten, to explain what is displayed in the figures.

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