

Review of:

Ultraviolet and Visible Complex Refractive Indices of Secondary Organic Material Produced by Photooxidation of the Aromatic Compounds Toluene and *m*-Xylene by Liu *et al.*

This paper reported the real and imaginary parts of refractive index (RI) in the UV and visible region for two types of secondary organic materials (SOMs) generated in the photooxidation of toluene and *m*-xylene. The initial NO_x concentration dependence of these RI values was discussed based on the chemical properties of the SOMs measured using infrared spectroscopy. Their results are interesting and should provide useful information to improve our understanding of the SOMs on the radiation balance and photochemical reactions including the production of OH and O₃. Manuscript is logically written and the topics are relevant to this journal. I therefore recommend publication once the comments and questions below are addressed.

Major Comments:

1) In this study, the authors determined *n* value using the spectroscopic ellipsometry and *k* values by measuring the UV-vis spectrum of the SOMs extracted by methanol after filter sampling. In their previous study (Liu *et al.* 2013), they determined both *n* and *k* values using the spectroscopic ellipsometry. Some explanation on the reasons that the author did not use the spectroscopic ellipsometry to determine *k* value should be added. In the analysis of the spectroscopic ellipsometry data, how do you treat the *k* values in this study? (Did you adopt the *k* values determined by the UV-vis spectroscopy in the analysis of the spectroscopic ellipsometry?)

2) The author suggested that “An absence of systematic error in retrieved refractive indices, as related to film thickness, was confirmed previously (Liu *et al.*, 2013).” However, the systematic errors in retrieved RI possibly depend on physical and chemical properties of the particles to form film. Especially, the viscosity of the SOMs should depend on their precursors, degree of oxidation, relative humidity, and so on. It will be nice if the authors will add some comments on this issue.

3) The author used equation (1) to determine *k* values. Do you have any information that the obtained *k* values can represent the *k* values for aerosol particles suspended in air?

Minor Comments:

1) Page 20591, line 25

“from 0.0018 to 0.0150” should be “from 0.0017-0.0153” ? (from Table 1).

2) Figure 6

“Spectra are normalized to the peak height at 1100 cm^{-1} , corresponding to a C–O stretch, to compensate for different masses on the filter samples.”

It seems to be better to show the spectra normalized to the peak area of C-H, because the C-H was used as reference in the discussions in this study.

3) Figure 7

“See Sect. S1 ...” should be “See Sect. S2 ...”