We are very grateful for the reviewer's comments. A point-to-point response to reviewers' comments is provided below, and the manuscript has been revised accordingly. The line numbers in the response refer to those in the revised version of the manuscript.

Reviewer #3: *"In this work, Li et al. have investigated the response factor of a Q-ACSM to secondary organic aerosols generated under different oxidation states and from various VOC precursors. The subject of this work is certainly within the scope of AMT and the results of this work are of practical interests to the ACSM/AMS community. The advantage of this work is that the aerosol standards were generated in situ and their oxidation states can be pre-defined. The experiments were designed with some novelty and were carefully executed. The manuscript was clear written. However, the manuscript still can be improved. A native English speaker is highly recommended to proofread the manuscript before it can be published. Overall, I think this work can be a valuable contribution to the AMS/ACSM community. Therefore, I would recommend this manuscript for publication after the authors address the following comments:"*

Response: As suggested by the reviewer, we have conducted additional calibrations (supplementary information section 1 and 2) to fully address the uncertainties of our measurement results. The discussion of this research is also limited to chamber-generated SOA only. The manuscript has been thoroughly proofread by a native English speaker. Following please find our specific responses.

Specific comments:

1. *"The authors shall pay more attention to the special terms and jargons used by the ACSM/AMS community. For example, the RF is not clearly defined here. The sensitivity of the ACSM/AMS has been investigated extensively in previous works. The results of this work seem to be in line with previous results. But the authors need to reorganize the manuscript to make the results of this work inter-comparable with other similar works, i.e., the results of this work can be evaluated under the same established framework."*

Response: The term "sensitivity" has been redefined as "response factor (RF)" and the Q-ACSM performance in measurements of organics has been defined as "relative response factor (RRF)" with respective to mass concentration determined by a SMPS-APM system (Lines 177-181). We have added another section of *3.4 Comparison with AMS Calibrations* (Lines 299-332) to inter-compare our results with previous works. One of the strength of our calibration comparing to the former calibrations is that we related the variations of CE_{org} to possible SOA phase changes (due to oxygen content changes) indicated by the effective density measurements. Another strength of this work is that we demonstrated that a relatively low resolution (for both response time and m/z) Q-ACSM can be used to study chamber-generated SOA. Overall, our CE_{org} calibration results were in accordance with former researches done with AMS.

2. *"For Fig. 8, how is this figure generated and how valid is this result? The author may want to provide more discussion and support information for validation."*

Response: Since HOA was not studied in this work, we limited our study to chamber-generated SOA only. To avoid possible overstatement, we have removed Fig. 8 from the manuscript. More information on instrument calibrations for Q-ACSM, SMPS, and APM, average number and mass distributions in all of the experiments were given in the supplementary information. The accuracies and uncertainties of the experiments were recalculated in a more careful way (e.g. we performed extra experiments to calibrate the ACSM lens transmission efficiency (E_L) and the calibrated E_L was used to modify PM_{SMPS}; we better evaluated and propagated the uncertainties in SMPS and APM measurements; we calculated the SOA coating thickness for the AS seed particles; we redefined "relative stable states" in each experiment) to make the results more reliable and precise. All the efforts above were meant to constrain the measurements uncertainty of a Q-ACSM. In the revised paper, we concluded that the variation of CE_{org} with f_{44} could explain a large fraction of the observed decrease in RRF, while the influence of RIE_{org} cannot be excluded.

The trends in RRF and CE_{org} for Q-ACSM were in accordance with those done with the high-resolution AMS, demonstrating the capability of the low-resolution Q-ACSM in doing SOA laboratory studies and the necessity to calibrate RF when conducting laboratory SOA experiments (Lines 36-41).