This contribution presents analysis of extinction properties of ambient particles in an urban environment in China (Nanjing) based on the information of particle number size distribution and particle phase chemical composition using an κ-EC-Mie model. The modeled results were compared with the measured ones obtained from the visibility data; also the relationship between the extinction properties of ambient particle and RH is discussed in the text.

Major comments:

The background information of theory and method used in this study is far too simplified, and it could be written out more explicitly in the introduction and method parts. When the author used Mie theory to calculate the extinction coefficient, more background information based on the theory need to be included into the introduction section. Similarly, the background information on the internally mixed model, externally mixed model and especially the core-shell model, which is a major method for the current paper, should be discussed more in the introduction part, for instance, the histories, the situations that the model works, the uncertainties of each model and pros and cons for each model.

The Experiment and methods part was not written in a satisfactory way. It is highlighted in the title that the extinction coefficient of the particles is the major results here, but the author did not include how you calculated or measured this parameter in the method part. Relevant paragraphs in the results section should be moved up into the method section.

Could the author reproduce some of the figures? The fonts and colors of some of the figures are too difficult to read. Please also consider presenting the figures in some other way. Time series of many parameters might not be necessary, but rather the scatter plots for the comparison of two variables that the author mentioned in the text are needed, for instance, it is really difficult to compare Fig. 7a and Fig. 8a, that I cannot fully agree with the author's statement in the text without a direct comparison of the variables from those two figures.

The author used the core-shell model to calculate the extinction coefficient, considering the particles consisting of a light-absorbing component and a non-light component. When the particles grew in

size due to hydration, we ended up with a change in the geometric cross section areas of particles, which affect their scattering. Also the refractive index for scattering also changed as the particles hydrated. So please clarify how you used the core-shell model to calculate the extinction, should be summation from scattering and absorption. As well, the Q values you used in the calculation should be explained more specifically. Should the Q be the summation from scattering parameter and absorption parameter?

In Fig.2 in your manuscript, ambient RH varied from around 40% to 80%. The author calculated the size-segregated kappa based on the ZSR mixing rule. However, under low RH conditions, the ZSR mixing rule might not hold, as the water activity decreases, solute concentrations increase and the interaction between different solutes might not be neglected.

The author calculated Eq. 2 in the manuscript from Eq. 1 based on the assumptions that the aerosols were internally mixed. Then the obtained GF was used to calculate the extinction coefficient as in Fig. 6b to verify the core-shell model is reasonable. Did the author try the internally-mixed/externally-mixed model and how is the correlation coefficient between the calculated and measured extinction coefficient. Were they much worse than the current values? It is dangerous to conclude that the core-shell model was reasonable, when the author tested only one model.

Minor comments:

Page 1, line 13: Please give the full name for an abbreviation, which was mentioned for the first time in the article.

Page 1, line 27-28: Please recheck the references and the literatures for the last 2-3 years could be added.

Page 2, line 4: Do you mean particle number concentration or mass concentration, please clarify, also in Page 2, line 9.

Page 2, line 16-17: Please rephrase the sentence, as the information given is not clear.

Page 2, line 25: Avoid using words like ‘if‘ or ‘of course (page 3, line 1, line 14)‘, or ‘oldest’ (Page 3, line 27). Tell the facts about the results;

avoid using too many oral statements. Please check this through the whole text.

Page 2, line 28: please change ‘thought’ to ‘though‘.

Page 3, line 2: What kind of uncertainties? From where, please clarify.

Page 3, line 5: I guess you mean ‘The real and imaginary parts of the refractive index for EC‘. EC cannot have imaginary part.

Page 3, line 8: similar to what? With water or EC, please clarify.

Page 3, line 11: Please give a little bit more details about Wex’s study.

Page 3, line 15: I think some particles did not show hygroscopic growth when RH increases from 20% to 30%. Please recheck your statement.

Page 3, line 27-28: Please consider changing the sentence.

Page 3, line 30: The Zdanovskii-Stokes-Robinson (ZSR) mixing rule (Zdanovskii, 1948; Stokes and Robinson, 1966) is not correctly cited here.

Page 4, line 12: of which measurement error is high at high RH. And what kind of error, please specify.

Page 4, line 25: please check the full name of the instrument.

Page 4, line 26: Change ‘the size distributions‘ to ‘the ranges of each size distribution‘. What is the time resolution of your impact sampler measurement?

Page 5, line 22: Please rephrase the sentence.

Page 6, line 1: For Eq. 1, please give proper explanation of each variable.

Page 6, line 17: delete ‘a‘. It is ‘Time series of …‘.

Page 6, line 18: Should the author put this sentence ‘the extinction coefficient was calculated…‘ to method part. Also, please specify it more clearly, as you also have had other method to calculate this parameter, avoid confusing. For instance, you can define this one as measurement-derived extinction coefficient and the other one as model-derived one. Also, should the extinction coefficient was calculated as 3.9/visibility. Please check the equation.

Page 6, line 19: The author wrote that Fig. 2 shows that the visibility has a strong negative correlation with PM2.5 and RH and also gave the correlation coefficient. Please consider add scatter plot of these three variables.

Page 6, line 21: For ‘had a good consistent with periods of high PM2.5‘, please consider either highlighting the periods or making a scatter plot.

Page 6, line 25: I would like to see in which particle size range the particles mass dominated.

Page 6, line 27: How could the particle size relate to the sources? Please specify, and which sources?

Page 7, line 1-3: Please specify how these assumptions relate to the different time resolution of film sampling and WPS measurements.

Page 7, line 10-20: Put this section into the method part.

Page 7, line 18: What kind of calculation results?

Page 7, line 21-26: In this article, you have light-absorbing component as well as non-light absorbing component. But you used visibility meter to measure scattering coefficient. Please check your visibility data. Then you ended up with the comparison of extinction from different method. Moreover, when the particles undergo hygroscopic growth, the scattering from the non-light-absorbing component was be enhanced. Please specify all of these relationships more explicitly. Clarify what the author really wants to tell.

Page 8, line 1: Give proper reference for Q, and explain it more specifically. Give the full name for BHCOAT.

Page 8, line 6: Please rephrase the sentence: its calculated value was consistent with human eye. How could the scientific results consistent with human eye?

Page 8, line 7: For 'If RH=0, GF=1', I guess you want to say under dry conditions, the particles did not take up water, thus GF as 1 was used as the input in Eq. 3 for calculating the extinction coefficient of particles under dry conditions.

Page 8, line 12: Please specify which values.

Page 8, line 13: How could the time series be in good agreement, please rephrase the sentence.

Page 8, line 19: You cannot compare the results when different wavelength was used. Only compare the one using wavelength as 940 nm and specify that for the analysis on chemical composition and RH dependency, wavelength of 550 nm was used.

Page 8, 13-19: When you talk about something in good agreement, not only the correlation coefficient, but also the fitting line and its deviation from 1 to 1 line should be discussed.

Page 8, line 19: What are scale parameters, where did you define them?

Page 8, line 27-28: I guess you mean you fitted the measured particle number size distribution into five segments. Please clarify.

Page 9, line 3-5: Please rephrase the sentence 'On average….'. The information is not clear. And when did you measure PM10 mass fraction?

Page 9, line 4-6: You mean an increase in the mass concentration or number concentration? What do you mean 'unit mass' here, please consider changing the sentence.

Page 9, line 7: The results of Kang et al., (2013) are from a different season, please clarify.

Page 9, any results/figures on chemical composition in particle phase should be given.

Page 9, line 20: It is not obvious to see the contribution fraction of the extinction coefficients from the mentioned size ranges increased, as well as the decreasing trend. Consider presenting it in another way.

Page 9, line 23: Which results, please clarify.

Page 9, line 27: It is actually not the extinction coefficient any more, but the extinction enhancement. Please be careful with your statement.

Page 9, line 12-30, please consider rewriting this paragraph. The information is not clearly given in the text. You cannot say divide a figure with another figure to get a third figure.

Page 10, Conclusions: This is more like a summary but not a conclusion. When you only tested the core-shell model, you cannot say it is reasonable without the information from other model results. And where did you get the PM10 mass fraction information. Where does your 45% come from?