2# Referee's comments:

This paper has presented the data on the morphology, microstructure, and composition of the submicron fraction of individual light-absorbing carbon (LAC) particles at altitudes of 120, 450 and 1500m, using transmission electron microscopy (TEM), and energy dispersive X-ray spectroscopy (EDS). It is interesting to see the number-size and volume-size distribution of these different submicron particles at the three altitudes. The microstructures (graphitic or amorphous) and compositions (C, O,. K, and S) of the particles in different altitudes are also presented. The results from this paper suggest that the vertical distribution of LAC types is not homogeneous and therefore the radiative effects of LAC are more complex. These results are of important values in atmospheric chemistry and physics. The current manuscript is well written and well organized and I suggest this manuscript is accepted for publication in the journal of Atmospheric Chemistry and Physics after minor revision.

Some minor comments:
1. For each altitude, only one sample is used in this analysis, which may represent an individual case rather than a general situation. Do you have more repetitive results for the samples from other flight schedule or from other day?

Response:
We have lots of unpublished data from other flights, same region, same range of altitudes. The results presented in this paper are from typical samples. Please see the response to other reviewer's comment. We made changes in our manuscript.

2. In our research for the soot on the peak of the Mt. Tai (1534 m a.s.l.), we have noticed that soot particles became coated very quickly and as a result of this aging, coated soot particles (with core-shell structure) are more common than the fresh naked soot particles. Since the particles at the elevated site (Mt. Tai) in eastern China are expected to be dispersed in regional and even larger scale areas. We assume that these coated particles should also be common in the air over the Yellow Sea? So, how often do you see the coated soot particles in your samplesïij§(Science of the Total Environment 430: 217–222)

Response:
We did not find any coated soot particles in our samples. Some of the soot particles were attached on the surface of the organic carbon as mentioned in the manuscript. We propose the difference between our samples and the one in this Paper (Science of the Total Environment 430: 217–222) may be due to the different collection time and climate condition. The collection time in the paper given by Referee is May 2008 during the passage of a strong cyclone. Our samples were collected at April, 2001 in dry continental air behind a cold front.

3. When analyzing the compositions of the particle with the EDS, the EDS of the target particles should be compared with the spectrum of the blank area in the filter. It is notice

that Silicon is present in some of the particles, but the spectrum of III in Figure 8 (f) showed that Si peak may be from substrate rather than from the particles.

Response:
The III spectrum was from the substrate. We agree with that it is possible that the Si peak were from the substrate, however, we believe some particles definitely contain silicon. As shown in Figure 8, the particle (I area) has negligible silicon, however, the tail of the particles has a higher concentration of silicon, sulfur and potassium.

4. Conclusion is too complex, and it should be short and concise.

Response:
Thanks for this suggestions. We have shortened the conclusion.

5. Figure 3: what height for this sample? I guess it is for the sample from the altitude of 450m?

Response:
Yes, thanks. We added it into the Figure captions.

6. Figure 7: what property does the line profile describe ?

Response:
We have explained the line profile procedure more clearly on page 11, Section 3.2, 2nd paragraph.