

## ***Interactive comment on “Mixing State of Refractory Black Carbon of the North China Plain Regional Aerosol Combining a Single Particle Soot Photometer and a Volatility Tandem Differential Mobility Analyzer” by Yuxuan Zhang et al.***

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Thanks for the comment. According to the referee's suggestion, we have added the following discussion in the manuscript, as shown below: "Aged BC particles with thick coating under the polluted conditions in China may imply that the light absorption of the thick-coated BC particles observed in the North China Plain could be significantly enhanced by lensing effects (Fuller et al., 1999; Lack and Cappa 2010; Liu et al. 2015; Moffet et al., 2009). Although, the actual magnitude of absorption enhancements of BC aerosol in the atmosphere remains unresolved due to complex morphology and

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inhomogeneity of ambient BC-containing particles (Adachi et al., 2013; Cappa et al., 2012; Fuller et al., 1999; He et al., 2015; Liu et al. 2015; Liu et al. 2017), the good agreement between LEO-fit retrieved optical particle diameter and mobility one for the thick-coated BC particles (Fig. 5B) suggested that the spherical core-shell assumption may be applicable in our case. Based on this assumption in the Mie simulation, the light absorption enhancement caused by the thick coatings on BC particles was  $\sim 1.8$ - $2.1$  during our campaign period."

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