

## Formation Of Tar Balls And Their Light Absorption: Direct Laboratory Studies

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Atmospheric tar balls are particles of special morphology and composition that form a major subset of brown carbon [1]. We generated particles in a laboratory apparatus from liquid tar obtained by the dry distillation of wood. The particles were studied with a HR-TEM equipped with an energy-dispersive X-ray detector. All the characteristic features (e.g. perfectly spherical shape, size, homogeneous composition, high C/O atomic ratio) of laboratory-generated particles matched those observed in atmospheric tar ball particles, as shown in the figure below.

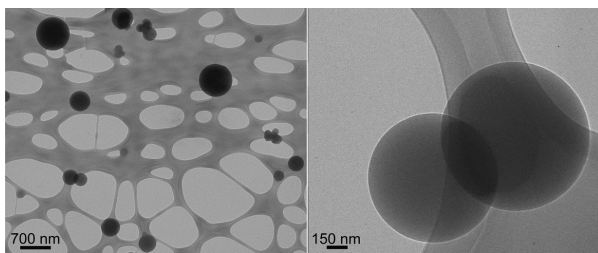


Figure:1 Bright-field TEM images of laboratory-generated tar ball particles

Based on our results we suggest that tar balls are formed by thermal and/or chemical transformation of ejected primary tar droplets upon biomass burning [2]. For the first time we experimentally determined the optical properties of tar ball particles and compared them to those of other subsets of the black-to-brown carbonaceous aerosol continuum.

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[1] Andreae & Gelencsér (2006) *Atmos. Chem. Phys.* **6**, 3131–3148 [2] Tóth *et al* (2013) *Atmos. Chem. Phys. Discuss.* **13**, 33089–33104