The role of carbonaceous particle morphology in ambient aerosol characterization

Physicochemical properties of the ambient aerosol observed at a specific site depend on its origin, formation process and characteristics of the airmass where it is found. These vary in time and space, therefrom the importance of characterising the aerosol properties to establish appropriate source-receptor relationships when dealing with this atmospheric pollutant. The Group of Atmospheric Pollution Characterization from CIEMAT started in 1999 the experimental studies on several aerosol properties (ambient concentration, chemical composition) in Madrid. Results from source-apportionment analyses provided information on the main aerosol sources (natural/anthropogenic, local/external) in this region. The source apportionment studies have confirmed that carbonaceous aerosol is the main constituent of the ambient aerosol mass (PM_{10}, $PM_{2.5}$ sizes) in Madrid. Organic carbon is the prevailing fraction in the carbon aerosol. The origin of this fraction, which can be primary emitted or be generated in the atmosphere as a consequence of physical and chemical transformations from gaseous precursor species, is being assessed. Elemental carbon represents 10% to 30 % of the total carbon aerosol (annual average) and the remaining carbonaceous aerosol is mainly comprised of traffic emitted (0.6 times the elemental carbon fraction) and secondary organic aerosol (Plaza et al., 2006).

One of the research lines of the group is focused on the morphological characterization of ambient aerosols. Morphology is related with the environmental and health effects of the atmospheric aerosols, with physicochemical properties as aerodynamic behavior, hygroscopicity or acidity (Coz et al., 2008), and with the water vapor nucleation and absorption and scattering of light (Seinfeld and Pandis, 1998). The talk will cover the morphology of some of the different types of atmospheric aerosols with special stress on carbonaceous compounds from both the atmosphere and some first laboratory generated compounds from previously known composition.

Coz, E., Artíñano, B., Robinson, A.L., Casuccio, G.S., Lersch, T.L. and S.N. Pandis (2008), Individual Particle Morphology and Acidity, *Aerosol Sci. Technol.*, 42:3, 224 – 232.

Plaza J., Gómez-Moreno F.J., Núñez L., Pujadas M., and B. Artíñano (2006), Estimation of secondary organic aerosol formation from semi-continuous OC-EC measurements in a Madrid suburban area. *Atmos. Environ.* 40: 1134-1147.

Seinfeld, J.H. and Pandis, S.N. (1998). *Atmospheric Chemistry and Physics:From Air Pollution to Global Change*. Wiley, New York.