

Combustion-generated carbonaceous urban ultrafine atmospheric UFPs: Waterborne-flora traps

U. K. Onwukwe¹, I. Jaffer AL-Timimi¹, P. A. Sermon^{1*}

¹Laboratory for Nanoscale Materials, Bragg Building, CEDPS, Brunel University, Uxbridge, Middx., UB8 3PH, UK

The New Yorker [1] saw London as the cradle of air pollution and there is an element of truth in this. We know that there is a myriad of particulates in the atmosphere and some threaten human health [2]. These include primary (formed at source) or secondary (formed in the atmosphere) particles, such as dust, smoke, ash, carbon black and liquid droplets and can cause haze or fog if their size is 100nm-80µm. PM₁₀ and PM_{2.5} have particulate matter with average sizes ≤10µm and 2.5µm respectively. EPA defines UFPs as d<100nm (100x smaller than PM₁₀). In an urban environment, most UFPs come from vehicle exhausts; they contribute little to mass concentrations but rather contribute to particle number concentrations. It is this number concentration of 20nm NPs that is lowered by roadside vegetation. Thus the air we breathe [3] (averaging 13.6kg [4] or 10,000 litres of air per day for the average adult) potentially contains 0.1-10 trillion particles [4] that target people [5]/animals/plants [6]. Some of these may be ultrafine combustion- and traffic-generated particles (UFPs) smaller than 100nm [7]. It has been known for many years [8,9] that such airborne particulate pollutants can be biomonitoried [10] and attenuated/arrested [11] by terrestrial plants, urban forests [12] and green facades [13]. Figure 1 shows moss on which combustion-generated carbonaceous urban ultrafine particles (UFPs) have been sequestered. Here we explore with temporal and spatial resolution [14] the use of wetland/waterborne with *portobello mushroom spores* (PMS), *chlorella vulgaris* (CV) and *rotala rotundifolio* (RR) to control diesel-engine emitted carbonaceous ultrafine particles and the mechanism by which that occurs. In future we need such green technology in improved cities that will protect us from this pollution as we transition to zero-carbon economies.

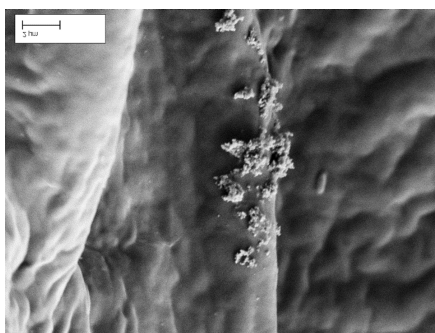


Figure 1. Diesel-emitted UFPs sitting on the surface of roadside moss (scale 2mm).

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