

Morphological Characteristics and Bioreactivity of Inhalable Particles during the Temple Fair in Kaifeng

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Abstract : This paper presents the result of plasmid assay of inhalable particulates PM10 and PM2.5 that were collected during the period of the 11th Hanyuan temple fair of ancestor worship in Kaifeng City. By use of a high-resolution Field Emission Scanning Electron Microscopy (FESEM) and image analysis (IA) technology, the morphological characteristics and Particle Size Distribution (PSD) of each were analyzed and the Bioreactivity of PM10 was evaluated by using plasmid DNA assay. The result shows that, as the dominant component of the samples taken in the urban area of Kaifeng City, the mineral particles, compared with the other components including the soot aggregates, coal ash, and unidentified particles, have a much greater amount and volume. The mineral particles exhibited a decentralized quantity - size distribution, whose presence could be available among the particles sizing 2.5 μ m or smaller. In contrast, the volume-size distribution of mineral particles is scattered in a relatively narrow range of between 1 μ m and 2.5 μ m. According to the plasmid assay the TD50 (toxic dose of PM causing 50% of plasmid damage, expressed in μ g/ml) of water-soluble PM10 and whole fraction of Kaifeng airborne PM10 was measured respectively at 220-208 μ g/ml and 300-400 μ g/ml versus 160 μ g/ml and 190 μ g/ml for PM2.5. It can be seen that the whole fraction of airborne particles caused more oxidative damage than the water-soluble fractions, and the PM2.5 has a greater oxidative capacity than the PM10.

Keywords : inhalable particulates (PM10 and PM2.5), morphological features, bioreactivity, Kaifeng

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