


Characterization of mixing state of tropospheric aerosols by using scanning electron microscopy (SEM) and energy dispersive spectroscopy (EDS)

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With the aim of understanding the role of aerosols and clouds in the global climate scenario as single components and/or as a system, the related recent studies are realized taking advantage of the space borne missions, of enormous advances in measurement technologies based on active/passive sensors and finally of analytical microscopy, spectroscopy and imaging science [1]. Referring to the necessity of the nanoscale imaging & spectroscopy, the recently scientific reports state that the atmospheric aerosols are a heterogeneous mixture of various particle types and its climate effects can only be fully understood through detailed knowledge of the physical and chemical properties of individual particles. As instance, the changes of particle shapes and mixing states through condensation, coagulation, and cloud processing influence how nano-sphere soot (ns-soot) particles mix with others [1, 2].

In this paper, air filters [air particle deposition from an aerosol spectrometer] are used to retain dangerous macro, micro and nano particles also different gaseous that can affect human health. The filter is made of micro and nano fibers of polytetrafluoroethylene (PTFE). The main applications of the filter are as quality monitoring systems and air filters fields [2, 3]. Filter was taken from an air quality monitoring from a thermal power station. Scanning electron microscopy (SEM) was performed using VegaTescan LMH II equipment with SE detector at 30 kV voltage of electron gun scan rate 5 and working distance 15.5 mm. Emission was 75 μ A, heat at 49% and stigmator at 1.1 and 0.9. The filter was analyzed as in use without metallization process using a double-sided copper band and images are presented in figure 1.

Chemical composition determinations (qualitative and quantitative) were realized using an energy-dispersive spectroscopy (EDS) detector from Quantax Bruker (XFlash silicon drift detector, Esprit software). Beside chemical composition determinations (after 5 area analyzed were identified next elements: Pb, Ca, Zn, Cu, Fe, Ti, Ni, Mn and C) mapping of the elements was performed, figure 2, on a selected area. The results present nano and micro particles retained in the air filter.

Keywords: *tropospheric aerosols, SEM, EDS.*



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Not applicable.

Conflicts of Interest

The authors declare no conflict of interest.

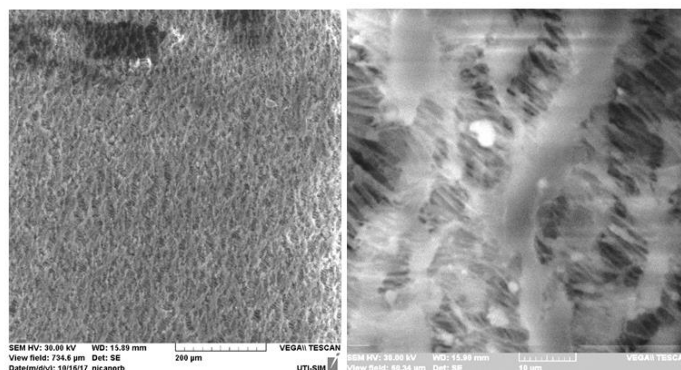


Figure 1. SEM images of air-filter left: 300x, right: 3500x.

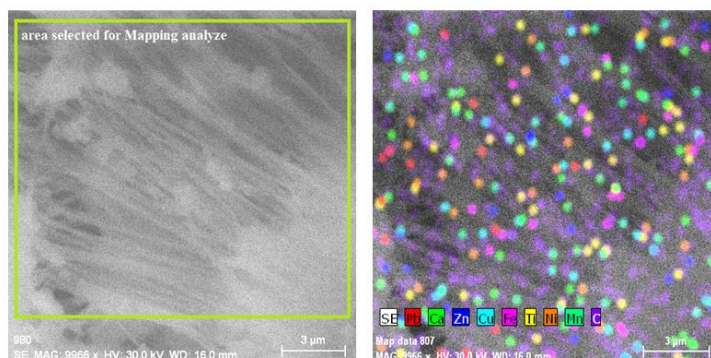


Figure 2. EDS area analyze, left: selected area and right: elements mapping.

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