Detecting asbestos-promoted •OH using APF

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Inhalation of mineral dusts, such as quartz, coal and asbestos, has been linked to the development of lung cancer. One of the mechanisms via which cancer is promoted is the overproduction of highly reactive oxygen species (i.e. hydroxyl radicals (•OH) catalyzed, in part, by Fe on the dust surfaces via the Haber-Weiss reaction series [1, 2]. In order to assess the potential of a mineral surface to promote the production of •OH an efficient technique for detecting •OH is crucial. Recently a new technique utilizing 3′-(*p*-Aminophenyl) Fluorescein (APF) has been developed providing a lower detection limit and better •OH specificity. In mineral and coal slurries the APF technique shows a characteristic increase in •OH concentration with an increase in sample loading [3, 4]. However, when applied to natural asbestos samples, including amphibole and chrysotile asbestos, a minimal change in •OH concentration with increasing sample loading is observed. Fluorescence adsorption and zeta potential analyses have been conducted to evaluate the possibility of an interaction between the APF molecule and mineral surfaces. It has been found that in the presence of the APF molecule all but two of the samples analysed show an increase in the magnitude of zeta potential. Further study is underway to better characterize the nature of this interaction.

[1] Fubini & Areán (1999) *Chem. Soc. Rev.*. **28**, 373-381. [2] Schoonen *et al.* (2006) *Rev. Min.* **64**, 179-221. [3] Cohn *et al.* (2008) *Particle Fiber Toxicol* **5**, 2. [4] Cohn *et al.*(2006) *Particle Fiber Toxicol* **3**, 16

Evolution of SOA formation and budget over the 21st century with implications for air quality

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Undoutedly, air quality has become a global problem. An ever increasing number of harmful substances is found in the atmosphere. Ozone has long been identified as one of the more serious of theses pollutants. More recently, particulate matter has made its way to the top of the list of species most likely to pose a severe threat to human health. Current air pollution abatement strategies, however, are increasingly being eroded by the impacts of climate change.

It is, therefore, necessary to review current and planned future air quality standards and to understand and predict how air quality will evolve with climate change over the 21st century. To this purpose the Earth-System-Model HadGEM2 [1] has been developed at the Met Office Hadley Centre. An extended tropospheric chemistry scheme, UKCA-ExtTC, has recently been added to the model. UKCA-ExtTC simulates the key pollutants that are of concern for present-day and future air quality. The chemistry is interactively coupled to both the climate and the terrestrial vegetation components.

The model is applied to study the impact of air pollution abatement strategies on the formation of biogenic and anthropogenic secondary organic aerosols (SOA). HTAP-like source-receptor studies [2] are conducted. The impact of a 20% reduction in NO_x emissions over selected areas is assessed. The consequences for SOA distribution and mass budgets are discussed. An assessment of the impact of future BVOC emissions on SOA formation and its impact on air quality is attempted.

[1] Collins *et al*. (2008) *Hadley Centre Tech. Note* **74**, 1-47. [2] UNECE (2007) *Air Pollution Studies No.* **16**, 1-167, United Nations, New York and Geneva.