"*In vitro*" modifications of mineral fibers – observations by transmission electron microscopy

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The biological effects of mineral fibers in the generation of diseases as fibrosis, lung cancer and mesothelioma are an important topic in medicine . In particular, the role of these minerals in reactive oxygen species (ROS) generation was recognized [1]. This suggests that not only morphology and dimension of fibers are the carcinogenic factors, but that other aspects such as the availability of metallic cations, structural defects and surface characteristics have to be considered, as well.

This work aims to study the transformations that occur in mineral fibers (chrysotile, crocidolite and asbestiform erionite) in an "in-vitro" environment with respect to morphology, chemical composition and crystallinity. In contrast, previous studies have mainly focused on the modifications that happen at cellular or tissutal level.

Mineral modifications were studied both inside mesothelial and bronchoalveolar cells, in order to investigate differences in two biological environments that represent the first target of exogenous fibers. Investigations were carried out through high-resolution transmission electron microscopy, first on the non-interacted starting material and then after different interaction times with cell cultures. This showed transformations on the three levels of investigations (morphology, chemistry and crystallinity degree).

Greater morphological and crystallinity modifications occurs in chrysotile, whereas higher chemical variation happens in asbestiform erionite, in particular for extra-framework cations. Crocidolite shows to be the most resistant in the biological environment, loosing mainly non-tetrahedral coordinated cations.

This approach will ultimately allow us to effectively model interaction dynamics and gather useful information for mineralogical, medical and biological applications.

[1] Schoonen M.A.A. et al. "Mineral-Induced Formation of Reactive Oxygen Species", *Reviews in Mineralogy & Geochemistry*, Vol. **64**, pp. 179-221, 2006, MSA.