

A study of radicals in industrial raw cristobalite powders

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In this study, we report the results of an experimental multianalytical characterisation of industrial cristobalite powders, used as raw materials for the artificial stone production. Cristobalite is considered a serious threat to the human health, being classified as a group 1 carcinogen by the IARC. The study was carried out through X-ray Diffraction (XRD), Scanning Electron Microscopy with Energy Dispersive microanalysis (SEM/EDS), continuous wave (cw) and pulse Electron Paramagnetic Resonance (EPR) spectroscopy. Our results, while confirming the almost exclusive presence of cristobalite in the powders, point out a sub-micrometric size of the structural coherence, associated to numerous stacking defects. Moreover, the material was found characterised by a relevant population of superoxide radicals, whose persistence appears conceivably long. Their presence in a material synthesized through a high temperature treatment points to a critical role of the grinding step in the industrial production of cristobalite. During this process, in fact, both superoxide generation and the presence of a substantial structural defectivity are induced. Indeed, cristobalite powders already result activated by a radical population, before any kind of process in the artificial stone production.