

An EPR study of silica radicals in lung tissues with evidence of silicosis

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The study of inorganic radicals associated to the respirable crystalline silica (RCS) is relevant for the definition of the health issues (silicosis, lung cancer and self-immune diseases) related to occupational exposure contexts.

In this study, a continuous-wave (cw) and pulsed Electron Paramagnetic Resonance (EPR) investigation of human lung tissue samples of an individual diagnosed of silicosis has been carried out. This technique, in fact, is able to trace the presence of radicals and of selected paramagnetic metal ions. Both types of paramagnetic species were observed through the cw-EPR survey, but their spectra resulted heavily superimposed. Through the use of an opportune set of pulse sequence and temperature, we were able to discern the two species, attributing the metal ion contribution to Cu(II) and the radical to an inorganic species. From the time-domain patterns, Cu(II) is found to interact with nitrogen atoms, thus supporting its attribution to biological Cu. Preliminary considerations about the radical species suggest its similarity to the inorganic Si[•] radicals already described in the literature.