

Toxicological applications of FT-IR spectroscopy: in vitro toxicity of silica nanoparticles on renal cells

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Addressing the toxicity of nanodevices is a milestone for the development of nanotechnologies in the biomedical field. Data allowing insight in cellular effects of nanoparticles, which may induce severe cellular disorders (inflammatory response, cell death, DNA damages, carcinogenesis) are of utmost importance. Among involved organs, kidney appears as a target due to its role in the elimination of xenobiotics.

In order to develop a potent and easy to run tool to explore nanoparticles toxicity on renal cells, mid infrared biospectrometry was used to follow toxicity of silica nanoparticles. Preliminary studies were realized on renal tubular cells which were exposed to different size of silica (SiO₂) nanoparticles (20 and 100nm) at different concentrations and at different times of exposure.

Spectroscopic data were correlated with *in vitro* toxicity results. SiO₂ nanoparticles present a different behavior according to their size, the smallest being the most toxic. A chemical fingerprint of oxidative stress was probed through an increase in the bands linked with lipid peroxidation according to biological results.

PCA analysis allowed to highlight cellular toxicity thresholds related to nanoparticle sizes and concentrations.

References

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