Combined intracellular SERS and cytotoxicity studies after uptake of silica nanoparticles

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Due to their extraordinary properties, nanoparticles with different characteristics have found multiple applications in various fields of today's life, such as pharmaceuticals and cosmetics, materials science, optics and catalysis. Apart from these anthropogenic sources, nanoscopic particles we are exposed to every day can also have natural origins e.g. mineral dust, fire, pollen, erosion and volcanic eruption. With their omnipresence, the investigation of toxicological issues of nanoparticles on living organisms arises.
The uptake of silver and gold nanoparticles enables sensitive detection of Raman spectra from different compartments inside living cells, using surface enhanced Raman spectroscopy (SERS). Therefore it can be used as a very useful method for cytotoxicity investigations of different kinds of nanoparticle interaction with cellular systems.

On the present poster, we report about the cytotoxic effect of commercial silica particles on 3T3 fibroblast cells. In order to determine optimum analysis parameters and to define a standard procedure for toxicity tests, we have first investigated cytotoxicity of silver and gold as well as silica nanoparticles on 3T3 fibroblast cells in different concentrations, media and incubation pulses using standard biological methods (XTT, live/dead-assay). By combination of Raman spectroscopy and cytotoxicity tests we are able to get valuable insight into the biologic reaction pathways of nanoparticles in living cells, starting from endocytosis, vesicular transport, accumulation and apoptosis.

References:

J. Kneipp, H. Kneipp, M. McLaughlin, D. Brown, K. Kneipp, *Nano Letters* 6, 2225-2231 (2006).