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The influence of media components on the stability and toxicity of silver nanomaterials

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In order to verify the effect of new products and applications, as well as to predict the possible ecological and human toxicity of nanomaterials, a large number of scientific papers describe toxicity tests for an enormous number of different nanomaterials. A factor that continues to be underrated or overlooked is the stability of these nanoparticles in the used test medium. In these complex environments, with a certain ionic composition and presence of organic matter like proteins, aggregation is a common phenomenon. The stability or aggregation status will significantly alter *in vitro* behavior as well as *in vivo* fate but is rarely taken into consideration. In this study, the stability of silver nanoparticles (AgNPs) with different stabilization mechanisms was investigated by visual analyses, spectrophotometry, dynamic light scattering and transmission electron microscopy (TEM). Media components can also have an influence on the observed toxicity of AgNPs. *Bacillus subtilis* was exposed to Ag+ - which is the main active species of silver - in growth media with different concentrations of some commonly used media components. The toxic effect was investigated by flow cytometry, TEM and by analyzing the growth curves obtained by optical density measurements. The results showed a strong influence of media components on both stability and toxicity of AgNPs. Microbiologists should take the chemical composition of the medium into account when designing the experiments and interpreting the results of (nano) silver toxicity studies. Our research provides a multidisciplinary approach because it is situated at the interface between microbiology and chemistry.

Biography

Pieter Vermeir (1984) has completed his PhD (in sciences) and postdoctoral studies (in engineering) at Ghent University and started a professorship (in biochemistry) in 2015. He is the director of the laboratory for chemical analyses, an analytical service and research lab focusing on method development, method validation and nano-characterization. He has published more than 20 papers in reputed journals in his young career.

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