**VP54: "Virus inactivation and attachment onto TiO2 Nanoparticles"**

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In recent years outbreaks of re-emerging and emerging infectious diseases have been a significant burden on global economies and public health. Population growth and urbanization along with poor water supply and environmental hygiene are the main reasons for infectious pathogen (e.g. viruses) outbreaks. This study examines the possibility of treating environmental systems containing infectious viruses with advanced disinfectant nanomaterials having unique physiochemical properties (e.g. TiO2 nanoparticles). Virus inactivation and attachment onto nanoparticles are hypothesized to influence virus fate and transport in the subsurface. Consequently, a series of static experiments were conducted at room temperature (25°C) to investigate the effect of visible light (VL) and the presence of quartz sand on virus attachment onto TiO2 nanoparticles (NPs). Toxicology considerations of TiO2 NPs and their potential application as antiviral materials are discussed in detail. Appropriate adsorption isotherms were determined. Also, the experimental virus inactivation data were satisfactorily represented by a pseudo-first order expression with time-dependent rate coefficients. Furthermore, electrokinetic features of viruses and TiO2 NPs were quantified for the present experimental conditions. Finally, interaction energies between viruses and TiO2 NPs were calculated based on the DLVO theory. The results of this study show that TiO2 NPs are quite effective for virus removal from dilute aqueous solutions.