



## **Interaction between graphene oxide nanoparticles and quartz sand**

Nikolaos P. Sotirelis and Constantinos V. Chrysikopoulos

Technical University of Crete, School of Environmental Engineering, 73100 Chania, Greece.

In this study, the influence of pH, ionic strength (IS), and temperature on graphene oxide (GO) nanoparticles adsorption onto quartz sand were investigated. Batch experiments were conducted at three controlled temperatures (4, 12, and 25 °C) in solutions with different pH values (pH=4, 7, and 10), and ionic strengths (IS=1.4, 6.4, and 21.4 mM), under static and dynamic conditions. The surface properties of GO nanoparticles and quartz sand were evaluated by electrophoretic mobility measurements. Derjaguin-Landau-Verwey-Overbeek (DLVO), and extended-DLVO (XDLVO) potential energy profiles were constructed for the experimental conditions, using measured zeta potentials. The experimental results shown that GO nanoparticles were very stable under the experimental conditions. Both temperature and pH did not play a significant role in the adsorption of GO nanoparticles onto quartz sand. In contrast, IS was shown to influence adsorption. Increasing the IS, dramatically increased. The adsorption of GO particles onto quartz sand increased dramatically with increasing IS, mainly due to secondary-minimum deposition, as indicated by the XDLVO interaction energy profiles. Furthermore, the experimental data were fitted nicely with a Langmuir type sorption isotherm, and the adsorption kinetics were satisfactorily described with a pseudo-second-order model.