



## **Effect of pH on dynamic and equilibrium surface tension of dissolve organic matter**

Gilboa Arye, Pavel Trifonov, and Talli Ilani

French Associates Institute for Agriculture and Biotechnology of Drylands, The Jacob Blaustein Institutes for Desert Research, Ben Gurion University of the Negev, Israel (aryeg@bgu.ac.il)

Dissolved organic matter (DOM) in the terrestrial environment may originate from the decomposition of soil organic matter accumulated from the degradation of vegetative residues, the release of root exudates, the lysis of microorganisms and addition of organic wastes, such as livestock manure, biosolids, and different composted organic residues, or from irrigation with wastewater. The structure of DOM macromolecules is known to vary with the following aqueous solution properties: ionic strength, the nature of the inorganic ions, pH and dissolved organic carbon (DOC) concentration. In aqueous solution, the DOM molecules are amphiphilic, that is, it possesses both hydrophilic and hydrophobic functional groups in the same molecule. This simultaneous presence, gave rise to the conceptual surfactant like model for DOM which has been studied in conjunction with the equilibrium surface tension at the liquid-air interface ( $ST_{eq}$ , mN/m). Measurements of  $ST_{eq}$  of DOM solution were reported in a relatively small number of studies for the conditions of the aqueous solution (e.g., temperature, pH, ionic strength, the valence of the metal ions, and DOC concentration). All studies demonstrate the decrease in  $ST_{eq}$  with increase aqueous concentration of the DOC. The effect of pH, however, exhibit contradictory results. Specifically, for a given DOC concentration, the patterns reported for  $ST_{eq}$  versus pH were different. With increasing pH values,  $ST_{eq}$  has been reported to decrease, increase or exhibit a minimum. These contradictory results have been attributed to the different DOC concentration examined in each of the studies. In current study we hypothesized that the inconsistent results of  $ST_{eq}$  vs. pH may also stem from the adsorption kinetics of the DOM amphiphilic molecules at the liquid air interface, which can be evaluated from dynamic surface tension measurements ( $ST_t$ ). The  $ST_t$  is approaching  $ST_{eq}$  values and commonly exhibiting an exponential decay pattern. If for different pH values  $ST_t$  is not reaching  $ST_{eq}$ , different apparent  $ST_{eq}$  vs. pH patterns can be obtained. In this study measurement of  $ST_t$  and  $ST_{eq}$  as a function of pH will be presented for DOM solutions from different origins. The analysis of the  $ST_t$  curves will be demonstrated based on a short and long term diffusion model.