

Evaluation of Molecular Charge Influence on Rotational Mobility within a Silica Sol-Gel Host Material

James W. Gilliland, Wai Tak Yip.

Department of Chemistry and Biochemistry, University of Oklahoma, 620 Parrington Oval Room 208, Norman, OK 73019 jgilli@ou.edu

In recent years, the field of materials science has focused on determining how to combine the functionality of biomolecules with the ruggedness of inorganic supports. However, before this combination can be optimized, a greater understanding of the interactions between a guest molecule and a silica host is needed.

To achieve this end, we seek to discover factors that control the interaction between an organic dye molecule and an inorganic silica sol-gel host. To eliminate the averaging effects of bulk measurements we employ the technique of single molecule spectroscopy to reveal the role of electrostatic charge on guest-host interactions within a silica sol-gel material.

Based on our results, charge repulsion contributes more to dye rotational mobility than charge attraction. However, both charge interactions exert less influence relative to the immobilization resulting from physical entrapment.