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MOLECULAR AND CHARGE-TRANSFER DYNAMICS AT AN ELECTRICALLY-CHARGED INTERFACE

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All electrically-charged surfaces, such as electrodes, exhibit an electromagnetic field just outside their surface. This field, surrounding the interface of a charged surface, has the ability to affect charged particles and electronic systems. The purpose of this research project is to see how two systems in solution exhibit different properties when exposed to the electromagnetic field of a charged interface, and how those properties differ from those existing in the bulk solution.

Our work thus far has involved creating experimental setups that expose electrically-charged surfaces to the following systems: the molecular dynamics of the poly-L-lysine protein in solutions of variable pH, as well as the charge-transfer of the toluene/TCNB complex. We have successfully designed a flow cell that will allow an aqueous solution to be deposited on a sample of PLL. We have also determined the conformations of PLL at room temperature within water and methanol. Our photocurrent measurements exhibited a current generated from the photodissociated products of the TCNB/toluene CT complex. The absorption of light with a wavelength of 355 nm produced the highest anodic current.

From here, we will continue to focus on our FTIR measurements by introducing new solvents in order to get a more visible spectrum of PLL. We will then begin to introduce buffers of varying pH to test the conformational changes to the structure of PLL. For our photocurrent measurements, our tests will continue with the TCNB/toluene complex introduced to new, low-polarity solvents in order to see their effects on generated current.