

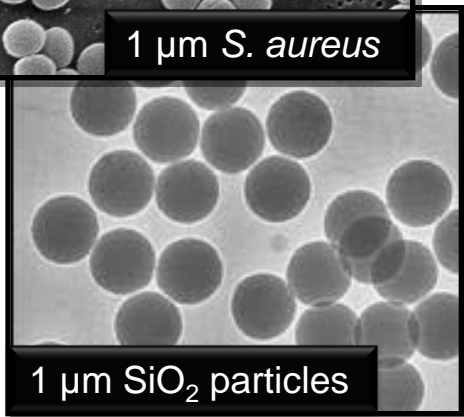
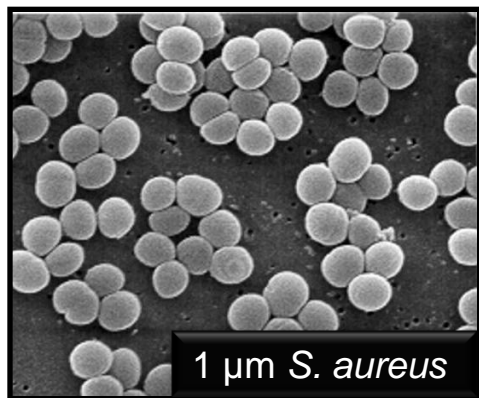


Modeling Bacterial Surface Heterogeneity Through Polymer Adsorption

Stephanie Kirby, ICE REU Program

PI: Professor Maria Santore (UMass Polymer Science and Engineering)

Collaborators: Surachate Kalasin (UMass PSE), Ana Rodríguez (REU Student)



http://www.fz-juelich.de/iff/d_iwm_syntheses/

Unless great care is taken to prevent it, some degree of heterogeneity is present on almost all surfaces. Bacterial surface heterogeneity leads to the adhesion of net negative cells to a negatively charged surface. Coating negative silica particles with cationic polymer models the bacterial surface, allowing us to study the impact of various types of surface heterogeneity.

Our studies investigate the effects of poly(l-lysine)-g-poly(ethylene glycol) (PLL-g-PEG), a brushy polymer that extends 2nm past the silica surface, as well as the effects of poly(l-lysine) (PLL), which lies flat. PLL-g-PEG has a steric impact on the silica's net charge, while PLL has a purely electrostatic impact.

Results show that PLL neutralizes the silica at a faster rate than PLL-g-PEG. The polymer brushes of PLL-g-PEG push out the edge of the electrical double layer far past the electrostatic interactions at the surface of the silica, decreasing the impact of any cationic polymer on the net charge.