**Designing Killer Surfaces: How to Stop a Microbial invasion on Solid Surfaces**

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Microbial proliferation and biofilm development on material surfaces can significantly damage equipment and provide suitable breeding grounds for dangerous pathogens. In clinical settings, the undetected spread of pathogenic bacteria can lead to hospital acquired infections (HAI's). In response to rise of HAI's stemming from biofilms and the impending antibiotic resistance crisis, the development of non-traditional, non-leachable antimicrobials has gained significant traction.[1] Physically attached, contact active antimicrobial surfaces with cationic active sites are of particular interest in the prevention of biofilm formation and pathogenic bacterial transfer. We have previously prepared a series of antimicrobial long alkyl chain ammonium and shorter chain sulfonamide quaternary small molecules with silane, phosphonate or UV-active benzophenone substituents that are readily applied to a variety of substrates including textiles, glass, and plastics. We have more recently extended this approach to prepare grafted polymeric onium coatings that can be tailored with either ammonium or phosphonium charges along the polymer backbone. These coatings were shown to be effective at killing gram+ve and gram-ve bacteria at solid/air interfaces. In this presentation I will highlight the amazing killing ability of these materials, and our first attempt at evaluating their antiviral properties against COVID-19 strains.