

## Lubricant-Impregnated Nanoporous Surfaces for Biofilm Prevention

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**Abstract :** Biofilms are formed by the attachment of microorganisms onto substrates via self-synthesized extracellular polymeric substances. They have been observed in the International Space Stations (ISS), in which biofilms can jeopardize the performance of key equipment and can pose health threats to the astronauts. This project aims at building conformal nanoporous surfaces that are infused with lubricant and decorated with antimicrobial nanoparticles while simultaneously evaluating their efficacy in preventing biofilm formation. Lubricant-impregnated surfaces (LIS) are fabricated by using a layer-by-layer assembly of silica nanoparticles to generate conformal nanoporous coatings on substrates and fill the films with fluorinated fluids. LIS has demonstrated excellent repellency to a broad range of liquids, preventing microbe adhesion (anti-biofouling). Silver or copper nanoparticles were deposited on the coatings prior to lubricant infusion in order to provide antimicrobial characteristics to the coating. Surface morphology and biofilm growth were characterized to understand how the coating morphology affects the LIS stability and anti-biofouling behaviors (stationary and in a flow).

**Keywords :** biofilm, coatings, nanoporous, antifouling

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