Developing Reproducible Antibacterial Surfaces Using Thermal Imprint Technology

Emily Kooistra-Manning, Montana Tech- Undergraduate Research Program, Montana Tech of the University of Montana, Butte MT. 59701

Staphylococcus aureus is a naturally occurring bacterium carried in human respiratory systems and on skin. Dangerous *Staphylococcus* infections in hospitals are of specific concern due to the high traffic and open wounds that exist in such facilities. One way these facilities can prevent on-site contraction of *Staphylococcus* infections is through rigorous disinfection of surfaces exposed to human contact. While disinfection with cleaning solutions can be effective, this method provides only a temporary solution. In contrast to temporary disinfection of surfaces, another approach may be to prevent the spread of *Staphylococcus* infections by engineering surfaces that are inherently antibacterial. Physicochemical properties of bacteria and the surfaces on which they live can influence bacterial adhesion to a surface. Recently, studies have been conducted which examine the effect of nanoscale features on biological specimens. Researchers have found that particular patterns naturally dissuade bacteria from attaching to and contaminating surfaces.

To build on this research, further work to create a reliable, cost-efficient, and reproducible antibacterial surface is needed. In this project, potentially antibacterial surfaces will be developed using thermal imprinting. A non-pathogenic form of *Staphylococcus aureus* will be used as a model *Staphylococcus* organism to test and quantify bacterial health on such surfaces. Although medical facilities present an obvious market for such surfaces, these patterning techniques can be used on other surfaces such as door knobs and toilet seats. Because of the inexpensive fabrication methods and materials, this research could lead to antibacterial surfaces being made readily available to populations no matter their socioeconomic backgrounds.