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Generating Antimicrobial Surfaces with Electrospinning Methods

The health care industry is constantly working to improve methods for maintaining environmental hygiene in our everyday lives. In school cafeterias, for example, plastic trays are decontaminated on a daily basis with sanitizing spray. This sanitation method is ineffective for complete removal of all bacterial contaminants. As one alternative to current methods, the use of specific polymer surfaces equipped with integrated patterns has proved to be a highly effective deterrent for bacterial adherence and growth compared to controls. Patterned polymer surfaces were fabricated using a highly efficient and relatively simple nanoimprint lithography method. *Staphylococcus aureus* is one type of bacteria commonly found in the nose, respiratory tract, and skin. *Mycobacterium tuberculosis* is another prime example of potentially hazardous bacterium that can thrive actively inside the human body. The alarming aspect of both *Staphylococcus aureus* and *Mycobacterium tuberculosis* bacterium species is their rapid increase in resistance to modern pharmaceuticals over the last 50 years (Centers for Disease Control and Prevention, 2013). The Centers for Disease Control and Prevention has estimated that increased drug resistance has cost the public billions of dollars and taken millions of lives. It is therefore imperative that alternatives to traditional antibacterial methods be explored. Electrospinning is a highly-recognized fabrication method utilized for its cost-efficient production of ultrafine fibers that can be produced with ease. The ultrafine fibers produced from electrospinning range in size from the nano to micro-scale and have beneficial qualities such as flexible structural morphology characteristics, high surface area, and the ability to manipulate mechanical properties. Antimicrobial polymer surfaces were made with a combination of electrospinning, electroplating, and nanoimprint lithography. The fabrication process and results from bacterial plaque counts will be presented.