Abstract:

This research aims to prevent bacteria adherence to urethral catheters through the use of antibacterial coatings on the surface and lumen of catheters. These coatings were covalently grafted to a silicone surface with the use of a nature-inspired polydopamine intermediate coating. Surface characterization techniques were done to show the successful coating of polydopamine and grafting of antibacterial molecules. Antibacterial assays were run to test the efficacy of these coatings.

Of the five coatings tested, two were able to inhibit biofilm formation significantly better than the current commercially used method of silicone according to a crystal violet assay. One of the coatings, 11-mercapto-trimethylamine (11-MTA) was able to penetrate the bacterial membranes very well killing over 90% on the surface. These results showed that amphiphillic cationic molecules are lethal to the membranes of gram-negative bacteria. During this research, a long term, and effective method was developed for preventing urinary tract infections and catheters encrustations for patients who use urethral catheters for a term longer than three months.