Redesign of Computer Keyboards for Hospital and Consumer Use

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Introduction

Extensive research has shown the prevalence of bacteria on hospital computer keyboards and mice. In one Army intensive care unit, 24% of keyboards had MRSA bacteria living on them [1]. Other studies have shown that up to 60.5% of computers and mice in medical facilities are home to gram-positive bacteria on them, of which 24% were populated with Staphylococcus aureus bacteria [2].

Our lab is designing a solution to this problem by coating keyboard keys in carbon nanotubes (CNTs). CNTs have compelling and unique material properties, and the demand for CNT products continues to increase in both research laboratories and in industry. In our lab, we have developed a unique Carbon-Infiltrated CNT (CICNT) coating that provides inherent, structural antimicrobial properties.

Materials and Methods

CNT growth is performed on prototype keyboard keys of 1.5x1.5 cm silicon wafers using a thermal chemical vapor deposition process. Our design was compared to four common keyboards currently on the market: a standard Mac computer keyboard, medical-grade waterproof keyboard, silver-coated antibacterial keyboard, and a plastic antimicrobial keyboard skin. Samples were analyzed using standard MRSA biofilm testing procedures and scanning electron microscopy.

Results and Discussion

Prior biofilm test results show the superiority of CICNT coatings at prohibiting MRSA bacteria growth over uncoated silicon, steel and PEEK materials. Initial biofilm test results also show that our CICNT keyboard keys reduce the growth of MRSA bacteria as compared to the four control keyboards. Additional biofilm testing is currently in progress to further confirm this hypothesis.

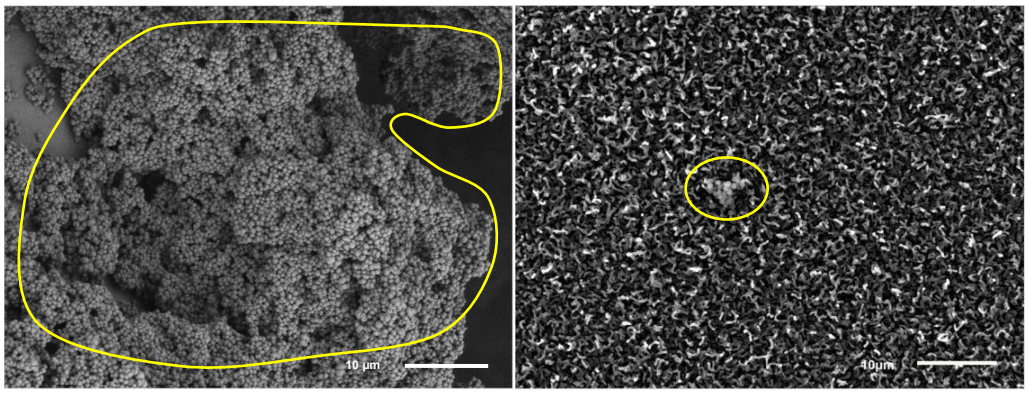

Figure 1: Comparison of standard MRSA growth on a PEEK surface to growth on a CICNT coated silicon wafer. Areas inside the yellow shapes show MRSA growth. Reference scale is 10 µm.

Conclusions

CICNT coated keyboard keys offer an exciting solution to reducing bacterial growth on computer keyboards. This has enormous potential in reducing bacterial infections and the spread of sickness in hospitals, schools, and homes. Future research will focus on protecting additional portions of current keyboards from bacterial proliferation, including the crevices between keys and the surfaces surrounding them. Research could also be done into application of CICNT coatings to other consumer products such as computer mice, car keys, or phones.

References

1. Bures, S., *American Journal of Infection Control*, 2000, Volume 28, Pages 465-471
2. Alemu, A., *Biomedicine and Biotechnology*, 2015, Volume 3, Pages 1-7