Optimizing Disinfectant Wipes for Use in the Healthcare Industry

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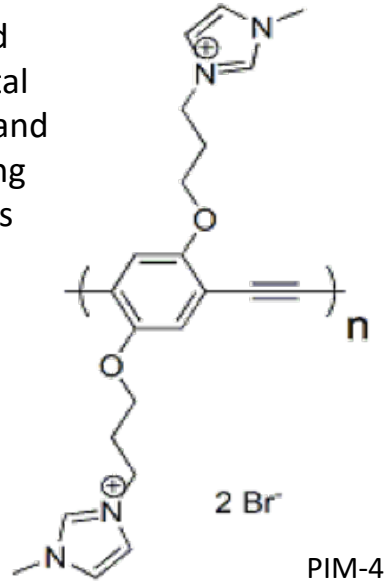
Motivation

There are 1.7M annual occurrences of hospital-acquired (nosocomial) infections. The top contributors are hospital stay duration, antibiotic misuse, and biofilm formation and bacterial adhesion. While the first two are not something that can easily be controlled for, the Whitten group feels well positioned to address the third major contributing factor.

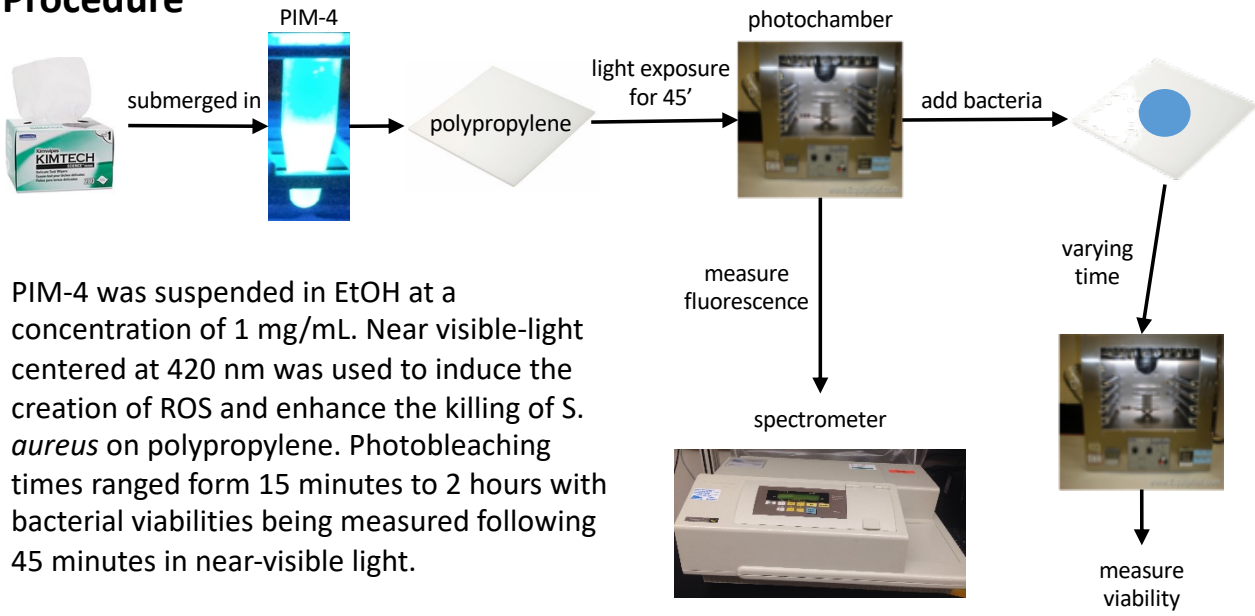
Goal

The objective of this project is to incorporate poly(*p*-phenylene ethynylenes) (PPEs) and oligo(*p*-phenylene ethynylenes) (OPEs) into Kimwipes for use as a disposable disinfectant.



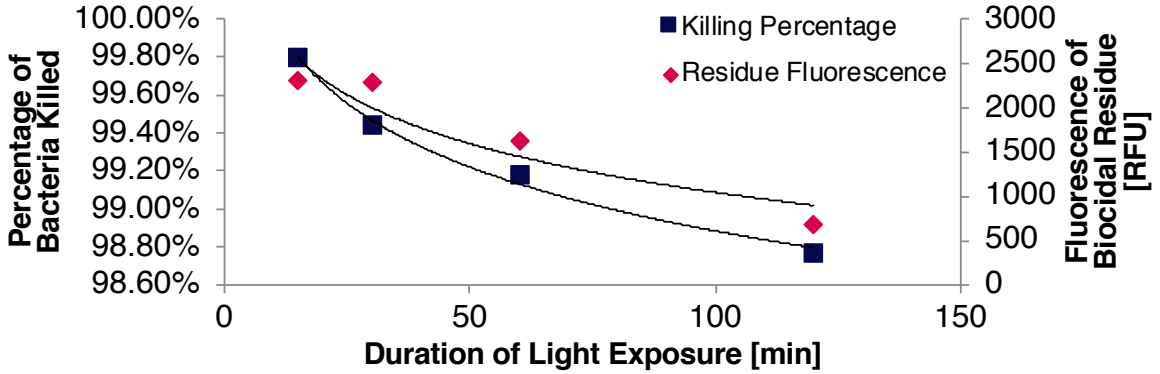
PIM-4

Procedure



PIM-4 was suspended in EtOH at a concentration of 1 mg/mL. Near visible-light centered at 420 nm was used to induce the creation of ROS and enhance the killing of S. *aureus* on polypropylene. Photobleaching times ranged form 15 minutes to 2 hours with bacterial viabilities being measured following 45 minutes in near-visible light.

Results



For PIM-4, ~3 log killing was observed with minimal photobleaching. 2 hours of photobleaching decreases the killing capacity to ~2 log kill, which corresponds with a drastic decrease in fluorescence. This suggests that fluorescence acts a legitimate indicator for biocidal activity.

Future Direction

- Applications in hospitals or ambulances
- Optimizing compounds for use in wound dressings
- Studying effects on an array of Gram-positive and Gram-negative bacteria
- Testing against clinical isolates such as MRSA or C. *difficile*
- Potential application in anti-biowarfare capacities