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Antimicrobial effects of sodium alginate/poly-L-lysine based films and their deposition onto urinary catheters using ultrasonic spray coating

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INTRODUCTION & AIM

Catheter associated urinary tract infections are become a major public health problem. Herein, we aimed to coat the catheter with antimicrobial to avoid microbial growth and infections. Initial studies investigated the antimicrobial properties of sodium alginate (SA)/poly-L-lysine (PLL) films as a proof-of-concept. Building on these findings, the coating strategy was extended to catheter surfaces using ultrasonic spray coating. To enhance antimicrobial performance, PLL was subsequently replaced with a peptide LyeTx I mnΔK.

METHOD

Antimicrobial films of SA/PLL were tested for antimicrobial properties. For catheters coatings, plasma-treated medical grade silicon sheets were coated with SA/LyeTx I mnΔK using ultrasonic spray coating. Multiple layers were applied under optimized conditions to obtain uniform coatings. Antimicrobial activity and contact angle of SA–LyeTx I mnΔK coatings were evaluated.

RESULTS & DISCUSSION

Table 1. Optical density of the *Staphylococcus aureus* incubated with SA/PLL films was measured in triplicate for each film.

Samples	Mean and Standard Deviation
SA + PLL	0.655 ± 0.076
SA	0.710 ± 0.045
Control	2.126 ± 0.004

Table 2. Optical density of the *Escherichia coli* incubated with SA/PLL films was measured in triplicate for each film.

Samples	Mean and Standard Deviation
SA + PLL	0.778 ± 0.024
SA	1.566 ± 0.388
Control	2.313 ± 0.040

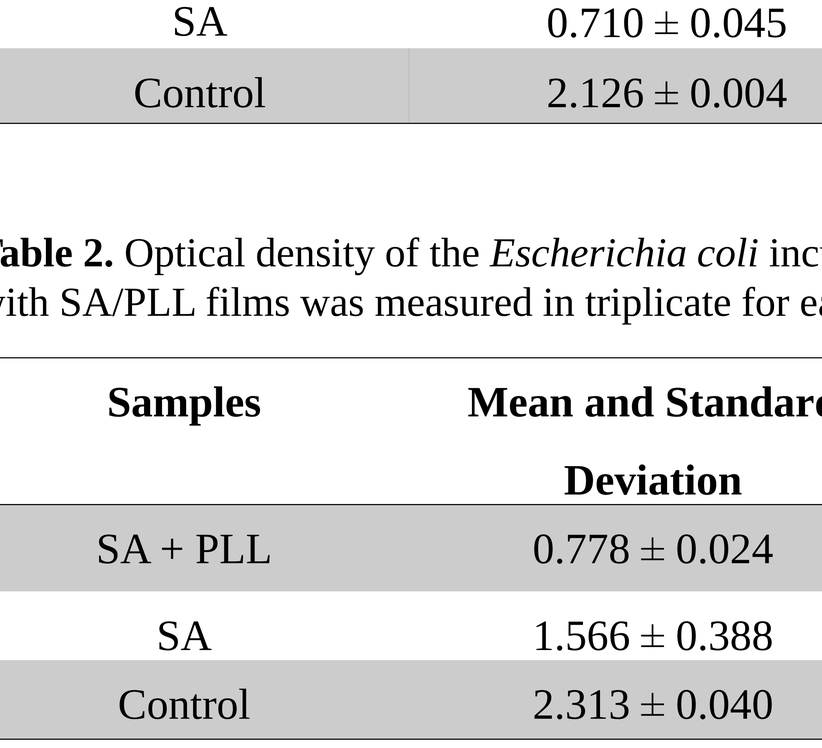

Figure 1. SEM images at 270X of magnification of SA coatings with different layers. 35-layered surface reveal a uniform coating.

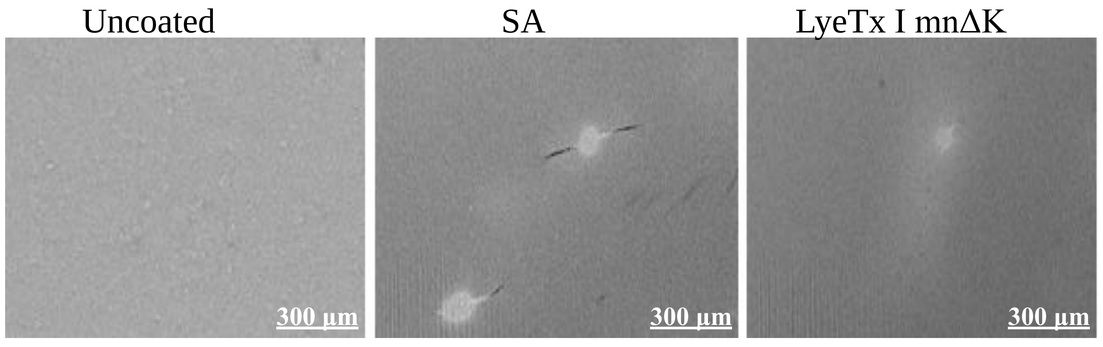

Figure 2. SEM images at 270X of magnification of uncoated silicon, SA coated and SA/LyeTx I mnΔK coating.

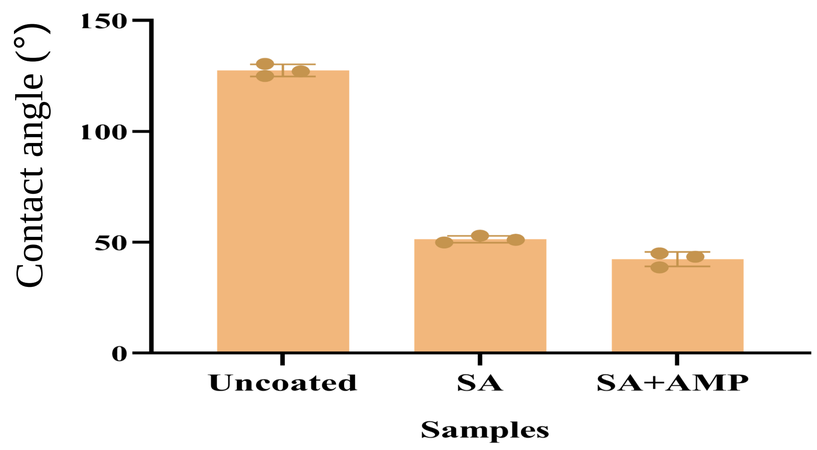

Figure 3. Contact angle analysis of uncoated and coated samples with SA and SA/LyeTx I mnΔK.

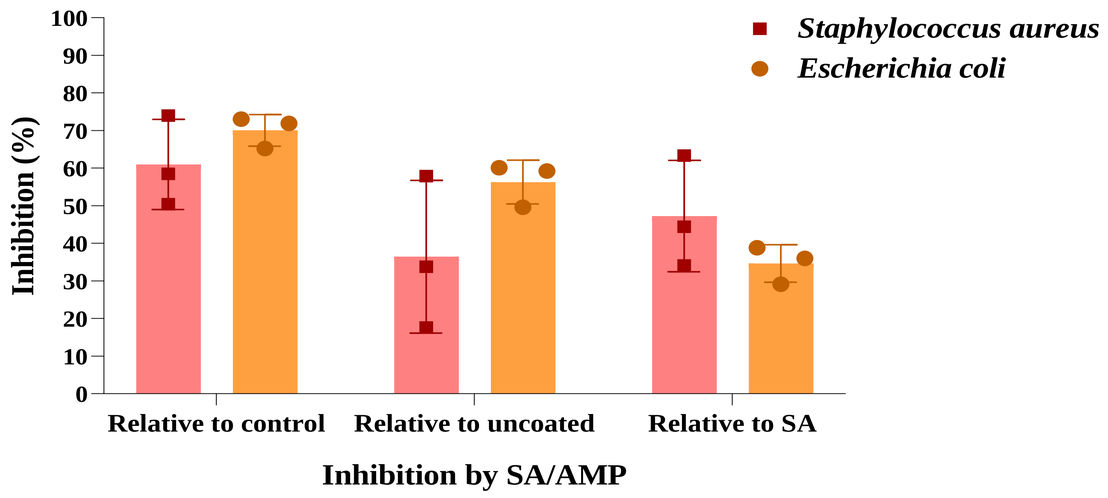

Figure 5. *S. aureus* and *E. coli* growth inhibition by SA/LyeTx I mnΔK-coated, relative to positive growth control, uncoated, and SA-coated samples.

CONCLUSION/FUTURE WORK

SA/LyeTx I mnΔK-coated silicon sheets showed good antimicrobial effects and coatings will be applied on urinary catheters to show the functionality of the coating method and stability of the coating.