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Poster abstract submission

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Poster title

Portable Spray Device for Rapid Deposition of Antimicrobial Polyelectrolyte Coatings

Poster abstract

The misuse of antibiotics in the 20th century has led to rising antimicrobial resistance, highlighting the urgent need for effective alternatives. Polyelectrolyte multilayers (PEMs), formed by the Layer-by-Layer (LbL) dip coating of oppositely charged polymers, have demonstrated both antimicrobial and anti-inflammatory properties. However, conventional LbL methods are time-consuming and impractical for clinical or household applications.

To address this limitation, a portable dual-solution spray device, protect|ION, was developed to rapidly apply antimicrobial PEM coatings on diverse substrates, including optical glass slides, medical-grade titanium, and medical-grade silicone. The study investigated the effects of spray parameters, distance, number of layers, and polymer concentration on coating performance using formulations of hyaluronic acid (HA) with poly(ε-L-lysine) (εPLL) or poly-L-arginine (PAR).

The optimized 10P5H formulation (10 mg/mL PAR30, 5 mg/mL HA) exhibited superior antimicrobial activity against Staphylococcus aureus (Gram-positive) and Pseudomonas aeruginosa (Gram-negative) compared to lower-concentration coatings. In vitro biocompatibility tests using fibroblasts confirmed over 70% cell viability after 24 h, indicating low cytotoxicity. In vivo wound infection models with bioluminescent methicillin-resistant S. aureus (MRSA) demonstrated a ~3-log reduction in bacterial load after 24–48 h, with no significant inflammatory response detected (see attached image).

These results validate protect|ION as an effective and biocompatible spray-coating platform for rapid, on-demand deposition of antimicrobial PEM films. The technology shows strong potential for use in preventing infections on medical devices and wound surfaces.

Research topic

Devices

If you wish to submit a graphic with your abstract you can upload it here.