N95 Salt Mask with Silicone Face Sealant

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Problem Statement

- COVID-19 has infected 570,000 healthcare workers in the US
- The coronavirus pandemic has placed strain on the supply of personal protective equipment (PPE), especially masks
- N95 masks are single use and can only be used for 8 hours, limiting longevity and reusability

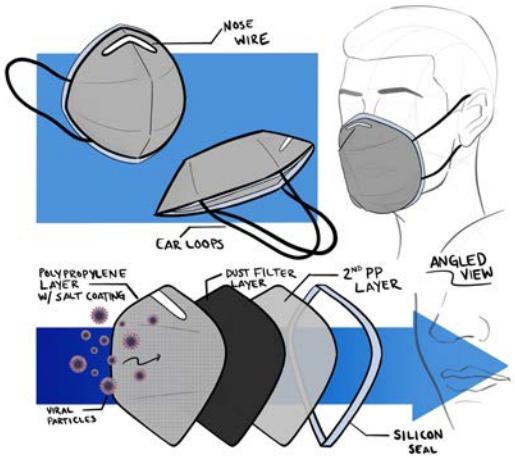
Needs Statement

"A way to **increase the lifespan** of N95 masks for healthcare professionals in **low resource areas**"

Proposed Solution

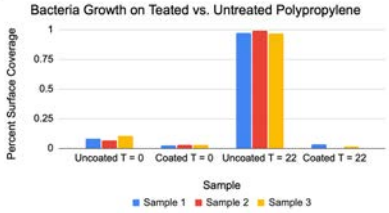
A polypropylene mask with:

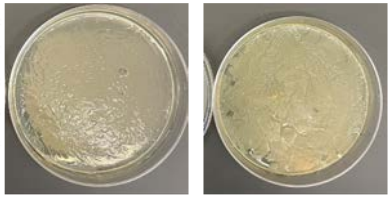
1. **Salt Layer:** The salt coating increases the effectiveness and reusability of the mask by puncturing bacterial/viral walls upon recrystallization of the salt
2. **Hydrophobic Sealant:** Acts as a final barrier to prevent external, contaminated air from entering



Final Prototype

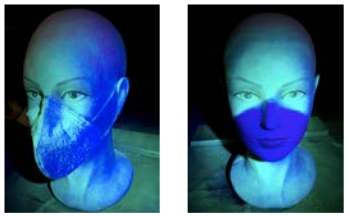

Antibacterial Activity Testing





The antibacterial activity from four independent test groups, T-0 hrs and T-22 hrs for both coated and uncoated samples, show that the salt coating on the polypropylene fabric effectively reduces E.coli growth and surface coverage

Filtration Testing



The mask and seal were effective at preventing particle penetration as shown by the absence of spray paint beneath the mask area

Reimbursement, Patents, and Cost

- Mask would not be reimbursed through Medicaid or Medicare
- 9901128B2 - "Face Mask and Seal with Neutralizer"
- 7017577B2 - "Antimicrobial Apparel and Fabric and Coverings"
- Estimated manufacturing cost would be about $0.53 per mask

Comfort Testing

Average Results from Group	Agreement (1-5)	Average Results from Group	Agreement (1-5)
Satisfied with the feel	2	Salt coating not issue to touch	3
Feel safe wearing for 8+ hours	2	Straps are comfortable	2
Can comfortably breathe	2	Glasses do not fog	2
Fits comfortably to my face	2	No condensation	2
No air gaps	1	No unpleasant odor	1
Adhesive face seal comfortable	2	No noticeable markings on face	3

Created based on interviews with healthcare professionals
Focused on comfort and breathability of mask for 8+ hours

Conclusions

- Salt effectively kills bacteria on the surface of the mask
- The silicone face seal makes an air-tight seal from the face to the mask

Acknowledgments

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