

Supporting information

Robust and self-lubricating polyvinyl alcohol tube with mucosa-like hierarchical architecture for endotracheal intubation

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In vitro stability testing of PVA tubes

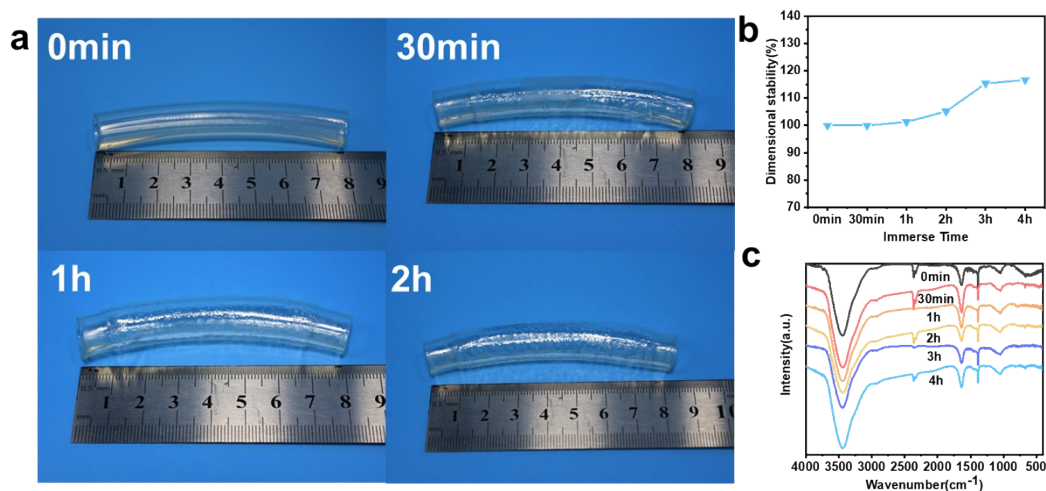


Figure S1 a) Digital photos of PVA tube immersed for different times; b) Dimensional stability of PVA tube after infiltration for different times; c) FTIR data of liquids infiltrating PVA tube for different times.

Property comparison of PVC and PVA tubes

The property and application of the PVC and PVA tubes were compared comprehensively as follows:

Reduced trauma in airway intubation: In airway intubation, the use of PVC often necessitates additional lubrication to facilitate smooth insertion, yet this can still result in mucosal trauma and discomfort. The self-lubricating property of PVA can guarantee a more seamless insertion process, thereby diminishing the likelihood of airway injury and mitigating potential complications such as swelling, infection, or damage to the vocal cords.

Implications of lubricants in intubation: The additional lubricants required for PVC intubation can sometimes be problematic, especially if they enter the respiratory

tract, potentially causing irritation or allergic reactions. PVA eliminates the requirement for these lubricants, consequently lowering the risk of associated complications.

Long-term clinical benefits and cost-effectiveness: Clinical studies have indicated that complications arising from airway intubation, including the relatively rare but severe condition of post-intubation laryngotracheal stenosis, may necessitate expensive long-term management. PVA, by minimizing airway trauma, has the potential to reduce the occurrence of such complications, leading to long-term cost savings and improved patient outcomes.

Enhanced patient safety in sensitive procedures: In delicate intubation procedures, particularly in pediatric or geriatric patients or those with existing airway complications, the gentle insertion facilitated by PVA can be crucial in avoiding further injury.

Advancing medical technology and scalability: As a novel application in airway intubation, PVA aligns with the trend towards innovative, safer medical technologies. While PVA currently presents a higher cost, its widespread adoption and potential manufacturing advancements could lead to cost reductions, making it a viable option for broader clinical use.

In conclusion, the specific application of PVA in airway intubation highlights its clinical significance. The material's inherent properties not only improve patient safety and comfort but also have the potential to reduce long-term healthcare costs associated with complications from traditional PVC intubation.