



Bi-layer sandwich film for antibacterial catheters

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Abstract

Background: Approximately one quarter of all nosocomial infections can be attributed to the urinary tract. The infections are supposed to be mainly caused by implantations of urethral catheters and stents. A new catheter design is introduced with the aim to lower the high number of nosocomial urethral infections. In order to avoid limitations to use, the design is first applied to conventional commercially available balloon catheters.

Results: The main feature of the design is a sandwich layer on both sides of the catheter wall, which is composed of a fragmented base layer of silver capped by a thin film of poly(*p*-xylylene). This top layer is mainly designed to release a controlled amount of Ag⁺ ions, which is bactericidal, but not toxic to humans. Simultaneously, the lifetime is prolonged to at least one year. The base layer is electrolessly deposited applying Tollens' reagents, the cap layer is deposited by using chemical vapor deposition.

Conclusion: The three main problems of this process, electroless deposition of a fragmented silver film on the surface of an electrically insulating organic polymer, irreproducible evaporation during heating of the precursor, and exponential decrease of the layer thickness along the capillary, have been solved through the application of a simple electrochemical reaction and two standard principles of physics: Papin's pot and the principle of Le Chatelier.