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Article

Internal Coating of Ureteral Stents with Chemical Vapor Deposition of Parylene

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Abstract: Ureteral balloon catheters and ureteral stents are implanted in large quantities on a daily basis. They are the suspected cause for about a quarter of all the nosocomial infections, which lead to approx. 20,000 deaths in Germany alone. To fight these infections, catheters should be made antibacterial. A technique for an antibacterial coating of catheters exhibiting an aspect ratio of up to 200 consists of a thin silver layer, which is deposited out of an aqueous solution, which is followed by a second step: chemical vapor deposition (CVD) of an organic polymeric film, which moderates the release rate of silver ions. The main concern of the second step is the longitudinal evenness of the film. For tubes with one opening as balloon catheters, this issue can be solved by applying a descendent temperature gradient from the opening to the end of the catheter. An alternative procedure can be applied to commercially available ureteral stents, which exhibit small drainage openings in their middle. The same CVD as before leads to a longitudinal homogeneity of about ±10%—at very low costs. This deposition can be modeled using viscous flow.

Keywords: plasma-enhanced chemical vapor deposition; xylylene; parylene; ureteral stent; viscous flow

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