

Antibacterial Self-Expandable Metal Stents (aSEMS) for bile duct strictures treatment

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Abstract:

Self-expandable biliary metal stents^[1] (SEMS) treat bile duct blocks and stenosis. They are flexible metallic tubes –in stainless steel, Nitinol, or Platinol- specially designed to hold the bile duct open, which has been blocked by chronic and benign biliary strictures or malignant obstructions. One of the current limitations of SEMS medical devices is related to the local bacterial adhesion and biofilm formation that led to stent obstruction^[2].

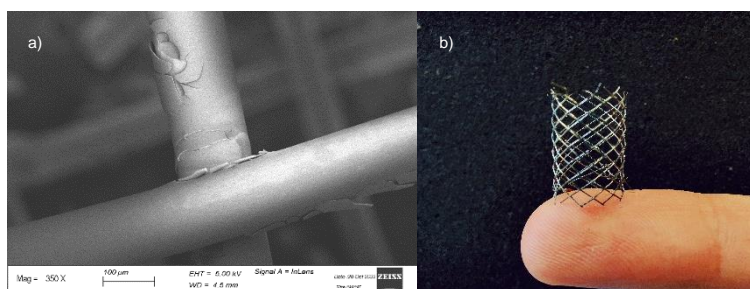


Figure 1: (a) SEM of functionalized SEMS; (b) SEMS

Here in this work, a stable antibacterial and antiadhesive coating have been developed to improve SEMSs performances and avoid biofilm formation. An effective sol-gel protocol based on dip coating has been applied to functionalize the SEMS surfaces, by optimizing the reactivity of precursors employed and by controlling parameters such as the number of dips and the oven temperature. The obtained aSEMS have been characterized by SEM to define coating homogeneity and by NMR and UV to define functionalization mechanism and coating stability.

Preliminary experiments of biofilm formation on functionalized and control SEMS surfaces have been performed using one of the most frequently isolated bacterial species from the intraoperative bile samples, i.e., *Citrobacter freundii*. It has been possible to estimate biofilm formation through absorbance measurements, highlighting a lower biofilm growth on functionalized SEMS, compared to the untreated ones.

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