On-Demand Drug Release from Gold Nanoturf for a Thermo- & Chemo-Therapeutic Esophageal Stent (TES)

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Here, we proposed a gold (Au)-coated nanoturf structure as a new implantable therapeutic interface for near-infrared (NIR)-mediated on-demand hyperthermia chemotherapy. The Au nanoturf possessed large doxorubicin (DOX)-loading capacities, which help facilitate drug release in a sustained and prolonged manner. Moreover, the Au-coated nanoturf provides reproducible hyperthermia induced by localized surface plasmon resonances (LSPRs) under NIR irradiation. Simultaneously, the NIR-mediated temperature increase can promote on-demand burst drug release at desired time points. For in vivo analysis, the interface was applied on a curved interface, i.e., a stent, which needs sustained anticancer treatment to prevent tumor recurrence on the implanted surface. We found that the implanted esophageal stent induced significant cancer cell death because of the effects of the drug and hyperthermia. These phenomena were also confirmed by theoretical analysis. The proposed strategy provides a unique solution to achieve enhanced thermo-/chemotherapy and has broad applications in sustained cancer treatments.