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Development and evaluation of nanoantibiotics via *in vitro* and *in vivo* imaging

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The focus of this study is to produce and test the efficacy of the antibacterial nanocomposites, which we have termed as "nanoantibiotics". The synthesized nanoantibiotics will be a nanocomposite structure, which is a combination of different nanomaterial constructs in one structure. The structure consists of a core, porous silica shell, in which an antibacterial drug is loaded, and a surface coating with a natural antibacterial polymer. The nanoantibiotics will be characterized and optimized after every stage of composition using dynamic light scattering, net surface charge measurements and transmission electron microscopy. The antibacterial activity of nanoantibiotics will be investigated on a strain of *Escherichia coli* through *in vitro* tests using time and concentration dependent analysis. The structure of the nanoantibiotics will then be reorganized with the incorporation of a fluorescent dye as a replacement for the antibacterial drug. The nanoantibiotics are accordingly modified to visualize their localization in the *in vivo* animal model by fluorescence microscopy and spinning disk confocal microscopy. The visualization of the modified nanoantibiotics in the gastrointestinal tract of *Drosophila melanogaster w*ill aid to assess their operability *in vivo*.

Keywords: Nanoantibiotics, Antibacterial activity, *Escherichia coli*, Transmission electron microscopy, Fluorescence microscopy, *Drosophila melanogaster*

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