Symposium Sessions

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- STRUCTURAL AND FUNCTIONAL MATERIALS — Expand

Meeting Venues

Moscone Center West
800 Howard Street
San Francisco, California, 94103

InterContinental San Francisco
888 Howard Street
San Francisco, California, 94103

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780 Mission Street
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Versatile Phenol-Incorporated Nanoframes for *In Situ* Antibacterial Activity Based on Oxidative and Physical Damages

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Print Abstract

Presentation Number: SB05.04.03

Tue, Apr 11

5:00pm - 7:00pm (Pacific)

Moscone West, Level 1, Exhibit Hall

0003

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Abstract Body

Gold nanoparticles (GNPs) with oxidase and peroxidase properties are great candidates for antibiotic-mimicking materials due to reactive oxygen species (ROS) production. However, the bioenzymic properties are not long-lasting due to the short lifespan of ROS and have only been observed from GNPs with a size of less than 20 nm, thus making the synthesis laborious and inefficient. Herein, GNPs with controllable size and effective ROS utilization are synthesized by an environmentally green process using natural phenols extracted from plants as the reducing and capping reagent. Functional metallic ions are chelated by taking advantage of the coordinating properties of phenols to form the versatile nanoframe (pGNP-Fe) that can self-assemble onto bacteria due to the inherent attraction rendered by phenols, and the physical pressure causes bacterial membrane damage. During internalization in bacteria, the cascade process resulting from the enzyme-like properties generates cytotoxic reactive ROS via oxidization, and the Fenton reaction enhances the antibacterial efficiency. This dual physical/chemical antibacterial process obviates the need for external antibiotics and antibacterial agents, which may otherwise pose toxicity in vivo. The fabrication strategy and materials properties described here provide insights into the design of antibioticmimicking materials based on enzymatic and physical effects.

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