Symposium Sessions

- CHARACTERIZATION — Expand
- ELECTRONICS, OPTICS AND PHOTONICS — Expand
- ENERGY AND SUSTAINABILITY — Expand
- MATERIALS MODELING AND DATA SCIENCE — Expand
- NANOMATERIALS — Expand
- QUANTUM MATERIALS AND SYSTEMS — Expand
- SOFT MATERIALS AND BIOMATERIALS — Expand
- 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

San Francisco Marriott Marquis
780 Mission Street
San Francisco, California, 94103

ZnL_2-BPs Integrated Bone Scaffold under Sequential Photothermal Mediation—A Win-Win Strategy Delivering Antibacterial Therapy and Fostering Osteogenesis Thereafter

View Presentation | Add to Schedule

Print Abstract

Thu, Apr 13
5:00pm - 7:00pm (Pacific)

Moscone West, Level 1, Exhibit Hall
0015

Presentation Number: SB01.03.16

Yuzheng Wu[*1], *Paul K. Chu*[1]
[1]City University of Hong Kong, Kowloon, Hong Kong

Abstract Body
Implant-related infections are serious complications after bone surgery and can compromise the intended functions of artificial implants, leading to surgical failure and even amputation in severe cases. Various strategies have been proposed to endow bone implants with desirable antibacterial properties, but unfortunately, most of them inevitably suffer from some side effects detrimental to normal tissues. In this study, a multifunctional bone implant is designed to work in conjunction with sequential photothermal mediation, which can deliver antibacterial therapy (<50 °C) in the early stage and foster bone regeneration (40–42 °C) subsequently. Black phosphorus nanosheets (BPs) are coordinated with zinc sulfonate ligand (ZnL_2), and the ZnL_2-BPs are integrated into the surface of hydroxylapatite (HA) scaffold to produce ZnL_2-BPs@HAP. In this design, BPs produce the photothermal effects and ZnL_2 increases the thermal sensitivity of peri-implant bacteria by inducing envelope stress. The biosafety of the antibacterial photothermal treatment is improved due to the mild temperature, and furthermore, the gradual release of Zn^{2+} and PO_4^{3-} from the scaffold facilitates osteogenesis in the subsequent stage of bone healing. This strategy not only broadens the biomedical applications of photothermal treatment but also provides insights into the design of multifunctional biomaterials in other fields.

Types

Onsite Poster