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## Development of Novel Supramolecular and Bioorthogonal Approaches to Overcome the Challenges of Photodynamic Therapy



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### **Abstract**

Photodynamic therapy (PDT) is a clinically approved treatment modality for a range of localized and superficial cancers. It utilizes light to excite a photosensitizer localized within malignant tumors, generating cytotoxic reactive oxygen species (ROS) through interactions with endogenous oxygen. As the three components are individually nontoxic, the treatment exhibits minimal invasiveness and less systemic toxicity compared with the traditional anticancer therapies. However, PDT still suffers from a number of limitations that hinder its clinical use. In particular, the low tumor selectivity and poor pharmacokinetics of most of the currently used photosensitizing drugs are problematic leading to prolonged photosensitivity after the PDT treatment. In this presentation, I will discuss our recent research advancements in overcoming these challenges through the application of supramolecular and bioorthogonal chemistry. By utilizing supramolecular and bioorthogonal approaches, we aim to achieve tumor-targeted photodynamic therapy. Furthermore, we have made significant progress in effectively suppressing the photosensitivity of residual photosensitizer post-PDT treatment through the implementation of bioorthogonal techniques. These innovative strategies have the potential to enhance the selectivity and safety of PDT for cancer treatment.

### **Biography**

Dr. XUE Yang received her B.Eng. degree in Pharmaceutical Engineering from Sichuan University and completed her Ph.D. at The Chinese University of Hong Kong (CUHK) under the guidance of Prof. Dennis K. P. Ng in the Department of Chemistry. Currently, she holds a position as a Postdoctoral Fellow at the Department of Chemistry, CUHK. Her research focuses on targeted delivery and site-specific activation of photosensitizers through supramolecular and bioorthogonal approaches for precise PDT. She also focuses on the promotion and detection of cell-cell interactions using bioorthogonal techniques to advance cell-based immunotherapy. Dr. XUE Yang has already published more than 10 papers in esteemed journals, including *Advanced Science*, *Journal of Controlled Release*, *ACS Applied Materials & Interfaces*, and *Journal of Medicinal Chemistry*. Her current research interests involve the development of advanced strategies to modulate and detect cell-cell interactions, facilitating cell-based immunotherapy, and designing multifunctional nanosystems for targeted cancer therapy. Additionally, she is committed to exploring novel supramolecular and bioorthogonal approaches for various biomedical applications.