Department of Chemistry
香港城市大學
City University of Hong Kong

Special Departmental Seminar

By

Prof. KIM Jong Seung

Professor
Department of Chemistry
Korea University, Korea

Molecular engineering of photo-activatable prodrug

Date: **30 May 2026 (Saturday)**

Time: **2:30 pm – 3:30 pm**

Venue: **P4302 (Purple Zone, 4th Floor)**
Yeung Kin Man Academic Building
City University of Hong Kong

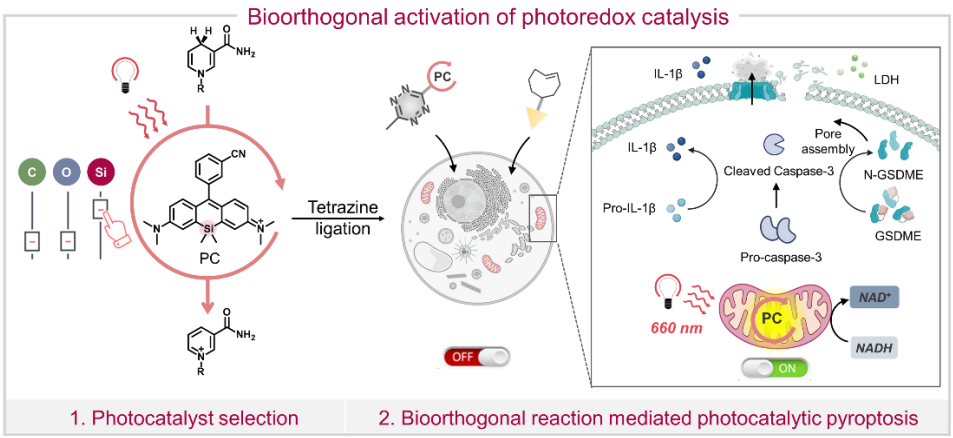
For abstract, please refer to the attached sheet.

Contact: Prof. SUN Hongyan (3442-9537, hongysun@cityu.edu.hk)

~ All Are Welcome ~

Abstract

The revolutionary impact of photoredox catalytic processes has ignited novel avenues for exploration, empowering us to delve into nature in unprecedented ways and to pioneer innovative biotechnologies for therapy and diagnosis. However, integrating artificial photoredox catalysis into living systems presents significant challenges, primarily due to concerns about low targetability, limited compatibility with complex biological environments, and safety risks associated with photocatalyst toxicity. To address these challenges, herein we present a novel bioorthogonally activatable photoredox catalysis approach. The introduction of 1,2,4,5-tetrazine quenched its photocatalytic properties, which were restored upon an intracellular inverse electron-demand Diels–Alder (iEDDA) reaction with *trans*-cyclooctene (TCO) localized in mitochondria. This reaction led to a remarkable photocatalytic oxidation of nicotinamide adenine dinucleotide (NADH), effectively manipulating the mitochondrial electron transport chain (ETC) under hypoxic conditions in cancer cells. Additionally, photocatalytic pyroptotic cell death was observed via the caspase-3/gasdermin E (GSDME) pathway, resulting in notable antitumor efficacy and ATP reduction in tumor cells.



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Biography

Jong Seung Kim received a Ph.D. in Chemistry and Biochemistry from Texas Tech University in 1993. He worked at Jay Kochi's lab at the University of Houston in 1994 as a post-doctoral researcher. He is currently a Distinguished Professor at Korea University, Seoul, Korea. His research interests include small-molecule-based drug delivery systems and photodynamic, photothermal, and sonodynamic therapy platforms. He has published more than 700 papers with 72,000 citations and H-index of 140 and registered about 100 intellectual patents to date. The Clarivate Analytics has consecutively named him a Highly Cited Researcher (HCR 1% Scientist) from 2014. He was elected as a member of Korea Academy of Science Technology in 2011. He received Inchon Award (2017) and Korea Science Award (2022). He also served as president of the Organic Chemistry Division of the Korean Chemical Society in 2022. He is now serving as an Executive Editor of ACS Appl. Bio Mater. and an Associate Editor of iRadiology.