Faculté de chimie
Université de Strasbourg

Laboratoire de Chémo-Biologie Synthétique & Thérapeutique CBST
UMR 7199 | Université de Strasbourg – CNRS

CONFERENCE

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Salle du conseil
Faculté de Chimie

Design, Synthesis and Applications of Photoactivatable Nucleic Acids in DNA Nanotechnology

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Le Prof. Lo sera disponible le lundi matin et après-midi, avant et après la conférence, si vous souhaitez la rencontrer envoyez un e-mail à alexandre.specht@unistra.fr ou frederic.bolze@unistra

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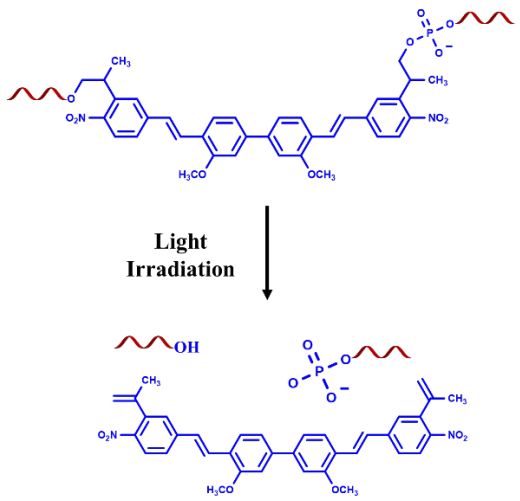
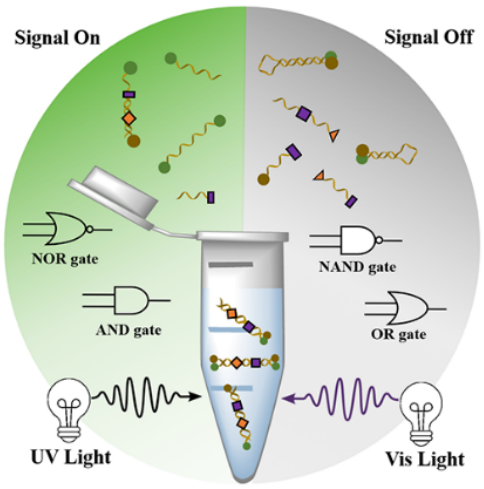
Abstract

DNA is emerging as a powerful and versatile nanoscale building block for the construction of precisely self-assembled nanostructures due to its desirable molecular recognition property, precise nucleobase sequence control, ease of chemical functionalization, and sensitive stimuli responsiveness. Light is the most promising non-invasive regulating input because it enables remote control of reaction systems with high spatial and temporal precision and without causing pollution. However, the synthesis of many reported photon photoactive groups does not allow for oligonucleotide conjugation, as they are often restricted to mono-functionalization. Moreover, these groups face limitations due to experimental and synthetic complexities. In this talk, I will present my research divided into three parts: (1) Redesigning the synthetic pathways of these photoactive molecules and synthesizing a series of bi-functional two-photon photocleavable phosphoramidite molecules using typical chemical reactions. (2) Effectively introducing these molecules to DNA strands at any sequence position through standard solid-phase synthesis using well-established cyanoethylphosphoramidite chemistry. This will allow the formation of light-activatable nucleic acids. (3) Utilizing these photocleavable nucleic acids as building scaffolds for the construction of DNA-based nanocarriers, which can be used for light-triggered cargo release. Additionally, they can serve as light-cleavable linkers in the construction of DNA devices that mimic the functions of Boolean logic gates. These devices can perform logic operations such as AND, OR, NOR, and NAND gates in response to different wavelengths of light inputs.





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Biography:

Peggy Lo is currently an Associate Professor in the Department of Chemistry at City University of Hong Kong. She obtained her BSc degree (First Class) and MPhil degree from Hong Kong Baptist University in 2004 and 2006, respectively. She then pursued her PhD in the Department of Chemistry at McGill University in Canada, completing her degree in 2010. Following her doctoral studies, she conducted postdoctoral research at Harvard University in the United States until her

return to Hong Kong in 2012. Peggy Lo has received several prestigious awards, including the Dream Chemistry Awards Top 5 in the Institute of Physical Chemistry Polish Academy of Science in Poland in 2013, The President's Awards in 2016, and the Excellent Teaching Award in 2024, both at City University of Hong Kong. She has also won the Gold Medal at the 48th International Exhibition of Inventions Geneva for her innovative invention project "TNA-Based Probes for miRNA Detection". Her research area is highly interdisciplinary, encompassing chemistry, biology, nanotechnology, and materials science. She focuses on developing multifunctional nano-sized materials and applying them in biomedical and technological applications.