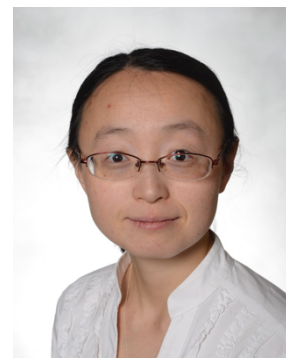


Chemical Approaches to Assay Cellular RNAs: from Localization to Modification



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Abstract

The past few years have witnessed the surging discoveries of indispensable roles that RNA plays in almost every aspect of cell functions. As more and more studies reveal unprecedented insights about RNA's impact on cell development and survival, current methods limit our capability to decipher RNA's biological function with high tempo-spatial resolution and specificity. Our chemical approach relies on in situ biomolecule oxidation by singlet oxygen generated from spatially confined fluorophores. Singlet oxygen has limited diffusion range due to their extremely high reactivity inside cells. As a result, only the adjacent guanosines as well as electron rich amino acids (histidine, tryptophan, tyrosine, etc.) are oxidized by singlet oxygen. The oxidized molecules are susceptible to nucleophilic attack by propargyl amine. We have successfully appended alkyne groups onto biomolecules such as RNAs and proteins. These chemical handles allow a variety of downstream analysis, including confocal imaging and RT-qPCR.

Meanwhile, we have designed new chemical probes to facilitate the identification of adenosine-to-inosine edited RNAs. These reagents combine a conjugate acceptor for selective inosine covalent modification with functional groups for bioorthogonal biotinylation. The resulting biotinylated RNA was enriched and verified with RT-qPCR. This powerful chemical approach provides new opportunities to identify and quantify RNA editing sites.

Biography

Dr. Li received her bachelor degree in Chemistry at Tsinghua University in 2009 and did her undergraduate research with Prof. Xi Zhang and Prof. Huaping Xu. She got her Ph. D. degree in Chemistry with Prof. Steven C. Zimmerman at University of Illinois, Champaign-Urbana in 2016. She moved to University of California, Irvine for postdoctoral training in RNA biology with Prof. Robert C. Spitale. Dr. Li joined HKU Chemistry Department in May 2019.