



# Hong Kong RNA Club



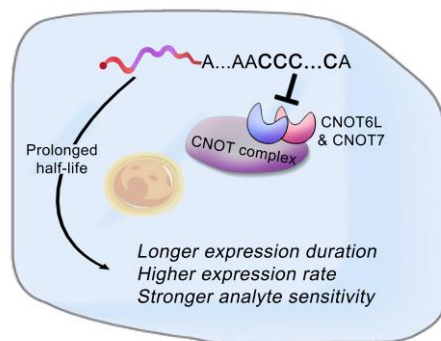
## RNA Enthusiast Spotlight (Feb 2023)



**Mr. Jacky Cheuk Yin LI** is a Ph.D. student in Dr. Becki Yi Kuang's laboratory in the Department of Bioengineering, The Hong Kong University of Science and Technology (HKUST). He received his Bachelor's degree in Chemical and Biomolecular Engineering and his MPhil in Bioengineering from HKUST. He can be reached at [cyliaf@connect.ust.hk](mailto:cyliaf@connect.ust.hk).

Jacky's study mainly focuses on the modification and delivery of synthetic mRNAs. He is interested in exploring the modifications of mRNA in both naturally existing and synthetic mRNAs, studying their effects on mRNA stability and translation efficiency, and identifying the mechanisms regulating these effects.

Recently, Jacky and his labmates analyzed the effect on mRNA of non-adenosine nucleotide in poly(A) tail. The team discovered cytidine in poly(A) tail would promote half-life and protein production. By systematically testing the type, position, and amount of non-adenosine nucleotide in poly(A) tail, they optimized the sequence to maximize this enhancement effect. The team has also demonstrated that the optimized sequence can be used parallelly with other existing mRNA enhancement technologies to synergistically boost protein production. Mechanistically, the team discovered that the cytidine in poly(A) tail would block the deadenylase complex and slow down the process of mRNA degradation in cells and *in vivo*.



### Recent representative publications

Li, C. Y., Liang, Z., Hu, Y., Zhang, H., Setiasabda, K. D., Li, J., ... & Kuang, Y. (2022). Cytidine-containing tails robustly enhance and prolong protein production of synthetic mRNA in cell and *in vivo*. *Molecular Therapy-Nucleic Acids*, 30, 300-310.

Lu, Q., Hu, Y., Yin Li, C., & Kuang, Y. (2022). Aptamer-Array-Guided Protein Assembly Enhances Synthetic mRNA Switch Performance. *Angewandte Chemie International Edition*, 61(34), e202207319.

Feng, R., Chang, A. C. Y., Ni, R., Li, J. C. Y., & Chau, Y. (2022). mRNA Delivery and Storage by Co-Assembling Nanostructures with Designer Oligopeptides. *ACS Applied Bio Materials*, 5(7), 3476-3486.

Jacky's favorite RNA class is mRNA. mRNA is the template for protein synthesis. Any protein can be synthesized in cells by using mRNA with the corresponding protein encoding sequence. The protein being made is not limited to existing protein, which gives us infinite possibilities on what we can design depending on our creativity.

His favorite quote is "Experience is simply the name we give our mistakes." by Oscar Wilde. He understands people aren't always perfect and failure is inevitable in life. When facing failure, he reflects on the reasons behind it and how to avoid it again, turning the failure into a valuable learning experience. He believes these experiences would eventually guide him toward success.



**Dr. Yi Kuang (Becki)** is an assistant professor in the Department of Chemical and Biological Engineering at the Hong Kong University of Science and Technology (HKUST).

Dr. Kuang's group designs various synthetic molecular devices. Her team studies how different RNA modifications affect the function of RNA molecules. Based on these findings, her team built functional molecular devices to control cell fate. In her recent works, her team elucidated the molecular mechanism of base modification and non-canonical mRNA tails. Riboswitch with low-to-no signal noise and synthetic mRNA construct with enhanced protein production ability is built based on these findings. Her recent work has been reported by many newspapers. In addition, Dr. Kuang's group is

also interested in developing molecular devices for controlling the differentiation of induced pluripotent stem cells (iPSC). Please find more information on the website. <https://cbe.hkust.edu.hk/people/becki-yi-kuang-kuangyi>

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Zhao, H., Cheng, Y., Li, J., Zhou, J., Yang, H., Yu, F., Yu, F., Khutsishvili, D., Wang, Z., Jiang, S., Tan, K., **Kuang, Y.**, Xing, X., & Ma, S. (2022). Droplet-engineered organoids recapitulate parental tissue transcriptome with inter-organoid homogeneity and inter-tumor cell heterogeneity. *Fundamental Research*.

Parr, C. J. C., Wada, S., Kotake, K., Kameda, S., Matsuura, S., Sakashita, S., Park, S., Sugiyama, H., **Kuang, Y.**, & Saito, H. (2020). N 1-Methylpseudouridine substitution enhances the performance of synthetic mRNA switches in cells. *Nucleic acids research*, 48(6), e35.

Matsuura, S., Ono, H., Kawasaki, S., **Kuang, Y.**, Fujita, Y., & Saito, H. (2018). Synthetic RNA-based logic computation in mammalian cells. *Nature communications*, 9(1), 4847.

Dr. Kuang is constantly fascinated by the diverse and complex roles of RNAs in cells. She believes that understanding how nature regulates the function of RNA molecules is essential for developing useful RNA devices for biomedical applications.

“In learning, you will teach, and in teaching, you will learn.” As a researcher and a teacher, Dr. Kuang believes that learning and teaching are inseparable; the foundation of two both learning and teaching is good communication. She enjoys brainstorming and discussing with her students.

RNAs are amazing molecules to study and design. There are still a lot of mysteries about RNAs and there are many fields that await novel RNA devices. She hopes talented people will gather in Hong Kong to expand our RNA community here.



# Hong Kong RNA Club

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