Shu Quan

Department: School of Biotechnology

Professional field: Protein Engineering

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Profile

Dr. Quan obtained her bachelor’ s degree from Tsinghua University in China in 2004 and her PhD degree from the University of Michigan in 2010. After three years of postdoctoral training, she joined the State Key Laboratory of Bioreactor Engineering in ECUST, China. Her laboratory is interested in investigating the fundamental questions regarding protein folding: 1. How do we stabilize proteins? 2. How do molecular chaperones work? The answers to these questions will help us design and evolve more stable biocatalysts, develop better protein therapeutics, and obtain more active chaperones. Her work is funded by the NSFC and the Pujiang Scholars Program in Shanghai. In addition to conducting research, she also enjoys training the next generation of scientists. She has undertaken the teaching work of two professional courses (Biochemistry for undergraduates and Biocatalysis and Enzyme engineering for graduate students, both taught in English) and is also a mentor for many undergraduate-level research activities, including iGEM.

Research Field

1. Develop protein stability biosensors and AI-based rational design methods to improve protein stability and solubility.
2. Identification and characterization of molecular chaperones. Investigate the working mechanisms of chaperones by using a variety of biochemical, biophysical, and bioinformatics techniques, such as NMR spectrometry, X-ray crystallography, and molecular simulation.
3. Screening for amyloid inhibitors.
4. Characterize the relationship between stability and activity of the MLL family of histone H3K4 methyltransferases.

Research results and selected published papers

Selected publications:

1. Ruan A, Ren C, Quan S*, Conversion of the molecular chaperone Spy into a novel fusion tag to enhance recombinant protein expression. Journal of Biotechnology 2020, 307:131-138
2. Ren C, Wen X, Mencius J, Quan S*. Selection and screening strategies in directed evolution to improve protein stability. Bioresources and bioprocessing 2019, 6, 53
3. Bazopoulou D, Knoefler D, Zheng Y, Ulrich K, Oleson B, Xie L, Kim M, Kaufmann A, Lee Y, Dou Y, Chen Y, Quan S, Jakob U*, Developmental ROS individualizes organismal stress resistance and lifespan. Nature 2019, 576:301–305.
4. Bai L, He W, Li T, Yang C, Zhuang Y, Quan S*, Chaperone-substrate interactions monitored via a robust TEM-1 β-lactamase fragment complementation assay. Biotechnology Letters. 2017 39(8): 1191-1199.
5. Quan S, Wang L, Petrotchenko EV, Makepeace K, Horowitz S, Yang J, Zhang Y, Borchers CH, Bardwell JCA*. Super spy variants implicate flexibility in chaperone action. eLife. 2014, 3:e01584.
6. Quan S, Tapley T, Koldewey P, Kirsch N, Ruane K, Pfizenmaier J, Shi R, Hofmann S, Foit L, Ren GP, Jakob U, Xu Z, Cygler M, Bardwell JCA*. Genetic selection designed to stabilize proteins uncovers a chaperone called Spy. Nature Structural & Molecular Biology. 2011, 18(3):262-269.
7. Quan S, Schneider I, Pan J, Hacht AV, Bardwell JCA*. The CXXC motif is more than a redox rheostat. Journal of Biological Chemistry. 2007, 282(39):28823-33

Full publication list: https://www.researchgate.net/profile/Shu_Quan/publications