

28AB-ISMS17 **Site-specific Incorporation of Unnatural Amino Acids and Cell-free Synthesis of Proteins toward Application to Antibodies and Antigens**

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Proteins are one of the most diverse classes of biological molecules and the building blocks that play a fundamental role in the biological processes of living cells. Thus, proteins are the key targets for alleviating a wide range of ailments, including cancer, diabetes and cardiovascular diseases. Significant technological advancements in molecular biology and genetic engineering have generated innovative protein-based drugs that are among the fastest growing class of drugs for the treatment and prevention of human diseases. Protein therapeutics have achieved tremendous success in clinical applications. However, there is room for improvement, such as enhancing the properties of the antibodies/antigens, as well as overcoming the technical difficulties in synthesizing the native forms of functional membrane proteins as antigens.

Over the past decades, our laboratory has developed a robust and state-of-the-art technical platform for 1) expansion of the genetic code (unnatural amino acids) and 2) cell-free protein synthesis technologies. The genetic code expansion allows the site-directed incorporation of unnatural amino acids into proteins, which is applicable to biologic drug development, such as antibody-drug conjugates (ADCs). The cell-free protein synthesis system is a powerful tool for the production of difficult-to-express proteins, including membrane proteins in their native forms with high purity and robust yields.

This talk will provide a brief introduction of our technologies and describe the potential of our platforms, which may create synergetic effects in the development of new therapeutic antibodies.