Ting "Patrick" Chao

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Protein biology / Computational modeling

More than 8 years of academic lab experiences; industrial experience in Novozymes R&D and Roche R&D. Trained and skilled in molecular biology, protein purification and spectroscopy techniques; 5 years of experience in analyzing large data set using mathematical/computational approaches, strong problem solving and data analysis skills; experienced in equipment operational trainings and presentations.

Skills

MOLECULAR BIOLOGY AND PROTEIN PURIFICATION

E.coli system protein expression	Protein gel electrophoresis
Molecular cloning	Size-exclusion chromatography
PCR (polymerase chain reaction)	Ion chromatography
DNA amplification and purification	HPLC(high-performance liquid chromatography)

SPECTROSCOPY AND SPECTROMETRY

UV-Vis spectroscopy	Mass spectrometry
Fluorescence spectroscopy	Amino acid analyzer
Circular Dichroism spectroscopy	NMR (Nuclear Magnetic Resonance spectroscopy)
Empower software	(protein solution 2D & high dimensional NMR)

COMPUTER SKILLS

Mathematica	C++
R language	Microsoft Office (Word, PowerPoint, Excel)

Research Experience

Industrial R&D Intern

ROCHE DIAGNOSTICS CORPORATION, INDIANAPOLIS, IN   **JUN – AUG 2016**

Contribute analytical methods to facilitate glucose meter development
- Developed fluorescence spectroscopy based methods to determine biochemistry reaction rate
- Documented potential protocol and future suggestions for rate determination
- Worked in a GXP (GLP) environment with a large team

NOVOZYMES NORTH AMERICA INC., FRANKLINTON, NC   **JUN – AUG 2015**

Optimize enzyme performance for bioethanol production
- Designed a variety of experiments with members of the team
- Developed methods for protein acid hydrolysis and implementing amino acid analyzer
- Discovered the mechanisms behind current enzyme performance issues facing 2nd generation bioethanol production

Research Assistant

DUKE UNIVERSITY, SCHOOL OF MEDICINE   **AUG 2014 – DEC 2017**

Experimentally characterizing the performance of a novel drug delivery system based on ELP proteins
- Collaborated with scientists in the department of Biomedical Engineering
- Developed novel spectroscopy methods to characterize molecular structures of ELP-based drugs
- Provided further understanding of how helical peptide drugs can stay active when using ELP proteins as delivery system

DUKE UNIVERSITY, SCHOOL OF MEDICINE   **AUG 2011 – DEC 2017**

Combining experimental / computational approaches to describe the mechanism of protein folding
- Routinely use high performance liquid chromatography, mass spectrometry & spectroscopy techniques
- Teamed with lab colleagues and NMR facility scientists to design and execute experiments
- Experimentally measured the flexibility (protein dynamics) of a protein(λ repressor fragments) in solution

- Developed computational / biophysical models to quantitatively describe protein dynamics
- Improved the accuracy significantly when predicting the flexibility of proteins

DUKE UNIVERSITY, SCHOOL OF MEDICINE   **JUN 2010 – AUG 2011**
Measuring biophysical properties of a large bacterial protein to discover its evolutionary origin
- Led the design in automating repetitive fluorescence spectroscopy measurements
- Implemented the automation in the collection of fluorescence titration data for several projects
- Analyzed experimental data through computation modeling
- Determined the biophysical parameters (thermodynamics stability) in different parts of the protein (tandem repeated domains) to depict how this protein helps bacteria survive

Training and Teaching Experience

Provided equipment operational trainings on experimental instruments to students and researchers in multiple departments
- Developed procedures for the training process on equipment operation and safety
- Designed and optimized experiments for each individual user
- Analyzed and suggested theoretical explanations for each user's results

Led group discussions of research ethics
- Led the group members to express opinions on keeping good research ethics
- Designed materials to engage the group in active discussions

Acted as teaching assistants in 3 graduate school courses
- Assisted in Structural Methods & Structural Biochemistry I/II
- Tutored students during office hours to understand course materials

Education

Duke University, School of Medicine, Dept. of Biochemistry — Ph.D. Dec. 2017 (GPA 3.96)
Nankai University (China), Department of Life Science — B.S. 2010 (GPA 3.78)

Publications

- (In preparation) Hughes RG., **Chao T.,** Oas TG., Schmidler SC. (2018). A Combined Biophysical-Statistical Model for Interpreting Amide Hydrogen Exchange Measurements. Biophys. J.
- (Submitted) Roberts S., Schaal J., Harmon TS., **Chao T.,** Hunt A., Miao V., Wen Y., Oas TG., Collier J., Pappu RV., Chilkoti A. (2017) Modulation of Order and Disorder in Recombinant Polypeptides Creates Injectable Tissue Integrating Network. Nature
- Yang W., **Chao T.,** Bai Y., Zhou R., Zhou W. & Bartlam M. (2010). Expression, purification, crystallization and preliminary crystallographic analysis of PA3885 (TpbA) from Pseudomonas aeruginosa PAO1. Acta Cryst. F66, 1473-1476.

Honors and Activities

Department PhD Outstanding Poster Award (2012)
3 years of excellent scholarships of Nankai University (2006-2009)
Attended International Conference for Bio-economy, P.R.China (June 2009)
Attended 28th Annual Symposium of The Protein Society, San Diego, CA (July 2014)
　　Presented a poster titled "Developing NMR Methods For Predicting Residue Helicity Of MetO-λ Unfolded State"
2 departmental seminar presentations for graduate school research