BIOGRAPHICAL SKETCH

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NAME: **Fei Philip Gao, PhD**

eRA COMMONS USER NAME (credential, e.g., agency login): philipgao

POSITION TITLE: Director

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.)*

INSTITUTION AND LOCATION	DEGREE *(if applicable)*	Completion Date MM/YYYY	FIELD OF STUDY
Peking University Medical Center, China	B.S.	1988	Medical Chemistry
University of Kansas, Lawrence, KS	Ph.D.	1996	Biochemistry
University of California in Los Angeles, CA	Postdoctoral	2000	Physiology, Immunology and Microbiology

A. Personal Statement

Being working full time in research areas of molecular biology, production and biophysical characterization of protein in the last 26 years, I have extensive experience in sample preparation of challenging proteins for enzymatic studies, NMR, X-ray crystallography, and Mass spectrometry. I equipped and managed a new membrane protein production facility from 2001-2007 in the National High Magnetic Field Laboratory at Florida State University and the COBRE protein production Core lab at University of Kansas from July 2008 to present. Both core facilities provide proteins to be used for team-based NIH projects to study structure and function of proteins.

I have always been interested in collaborative research and enjoy working with people from different disciplines and backgrounds. I have a record of successful and productive collaborative research projects in molecular biology and protein production in the past. I am confident that I will be able to make substantial contributions to the proposed research project.

B. Positions and Honors

Positions and Employment:

08/89–08/96 Graduate Research Assistant, laboratory of Dr. Mark Richter, Department of Biochemistry, University of Kansas, Lawrence, KS
08/96–08/00 Postdoctoral Fellow, laboratory of Dr. H. Ronald Kaback, University of California in Los Angeles, CA
06/99–06/00 Visitor, National High Magnetic Field, Florida State University, Tallahassee, FL
09/00–12/01 Visiting Scientist, National High Magnetic Field Laboratory, Florida State University, FL
01/02–04/07 Assistant Scholar Scientist, Membrane Protein Production Facility, High Magnetic Field Laboratory, Florida State University, Tallahassee, FL
05/07–06/08 Research Associate, Dept. of Molecular Biosciences, University of Kansas, Lawrence, KS
07/08-present Director, Protein Production Core Laboratory, University of Kansas, Lawrence, KS
05/13-present Founder and President, KanPro Research, Inc., KS

Honors and Awards:

1991 The Borgendale Best Graduate Seminar Award in Biochemistry, University of Kansas
1993 Graduate School Summer Fellowship, 1993, Univ. of Kansas
1996-1997 Howard Hughes Medical Institute postdoctoral fellowship
1997-2000 NIH Research Service Award

C. Contribution to Science

As a graduate student working on my thesis, I reconstituted the active core of the chloroplast ATP synthase which had been a difficult projects that had been worked by three generation of biochemist, including Dr. Efraim Racker. The success opened a new method to study the mechanism of ATP synthase.

I have been working full time research areas of molecular biology, production and biophysical characterization of proteins in the last 18 years since I receive my Ph. D. degree. I have contributed to the advance of science in protein purification, cell culture, molecular biology and fermentation and extensive experience in sample preparation of challenging proteins for enzymatic studies, NMR, X-ray crystallography, and Mass spectrometry.

I equipped and managed a new membrane protein production facility from 2001-2007 in the National High Magnetic Field Laboratory at Florida State University and the COBRE protein production Core lab at University of Kansas from July 2008 to present. Both core facilities provide proteins used for team-based NIH projects to study structure and function of proteins. I have been working in collaborative research with groups from different disciplines and backgrounds. I have a record of successful and productive collaborative research projects during the second phase of COBRE-PSF.

At present, I oversees the operation of the laboratory, operates and maintains related laboratory equipment and participate in cloning, expression and protein purification experiments. I communicate with a variety of users, internal and external to devise appropriate strategies for each project. I also supervise other laboratory members and guests and provides training on laboratory equipment and techniques.

Protein Production

1. Hu, J., Qin, H., Gao, F.P., Cross, T.A., A systematic assessment of mature MBP in membrane protein production: overexpression, membrane targeting and purification.Protein Expr Purif. 2011 Nov;80(1):34 40. doi: 10.1016/j.pep.2011.06.001. Epub 2011 Jun 13.PubMed [citation] PMID: 21689756, PMCID: PMC3183349
2. Qin, H., Hu, J., Hua, Y., Challa, S.V., Cross, T.A., Gao FP. Construction of a series of vectors for high throughput cloning and expression screening of membrane proteins from Mycobacterium tuberculosis.BMC Biotechnol. 2008 May 16;8:51. doi:10.1186/1472-6750-8-51.PubMed [citation] PMID: 18485215, PMCID: PMC2396618
3. Hu, J., Qin, H., Li, C., Sharma, M., Cross, T.A., Gao, F.P., Structural biology of transmembrane domains: efficient production and characterization of transmembrane peptides by NMR. *Protein Sci.* 2007 Oct; 16(10):2153-65. PMC2204124
4. Hu, J., Qin, H., Sharma, M., Cross, T.A., Gao, F.P., Chemical cleavage of fusion proteins for high-level production of transmembrane peptides and protein domains containing conserved methionines.Biochim Biophys Acta. 2008 Apr;1778(4):1060-6. doi: 10.1016/j.bbamem.2007.12.024. Epub 2008 Jan 11.PubMed [citation] PMID: 18230329

Protein Characterization

1. Naik, S., Kumru, O.S., Cullom, M., Telikepalli, S.N., Lindboe, E., Roop, T.L., Joshi, S.B., Amin, D., Gao, P., Middaugh, C.R., Volkin, D.B., Fisher, M.T., Probing structurally altered and aggregated states of therapeutically relevant proteins using GroEL coupled to bio-layer interferometry. Protein Sci. 2014 Oct;23(10):1461-78. doi: 10.1002/pro.2515. Epub 2014 Jul 28. PMID:25043635
2. Naik, S., Kumru, O.S., Cullom, M., Telikepalli, S.N., Lindboe, E., Roop, T.L., Joshi, S.B., Amin, D., Gao, P., Middaugh, C.R., Volkin, D.B., Fisher, M.T. (2014) Probing structurally altered and aggregated states of therapeutically relevant proteins using GroEL coupled to bio-layer interferometry. Protein Sci. doi: 10.1002/pro.2515. [Epub ahead of print]
3. Sokolov, M., Lu, L., Tucker, W., Gao, F., Gegenheimer, P.A., Richter, M.L., The 20 C-terminal amino acid residues of the chloroplast ATP synthase gamma subunit are not essential for activity. *J Biol Chem.* 1999 May 14; 274(20):13824-9.
4. Gao, F., Lipscomb, B., Wu, I., Richter, M.L., In vitro assembly of the core catalytic complex of the chloroplast ATP synthase.J Biol Chem. 1995 Apr 28;270(17):9763-9.PubMed [citation] PMID: 7730354

Solid State NMR

1. Li, C., Qin, H., Gao, F.P., Cross, T.A., Solid-state NMR characterization of conformational plasticity within the transmembrane domain of the influenza A M2 proton channel.Biochim Biophys Acta. 2007 Dec;1768(12):3162-70. Epub 2007 Sep 8.PubMed [citation] PMID: 17936720, PMCID: PMC2258276
2. Li, C., Gao, P., Qin, H., Chase, R., Gor'kov, P.L., Brey, W.W., Cross, T.A., Uniformly aligned full-length membrane proteins in liquid crystalline bilayers for structural characterization.J Am Chem Soc. 2007 May 2;129(17):5304-5. Epub 2007 Apr 4. No abstract available. PubMed [citation] PMID: 17407289, PMCID: PMC2569975
3. Tian, C., Gao, P.F., Pinto, L.H., Lamb, R.A., Cross, T.A., Initial structural and dynamic characterization of the M2 protein transmembrane and amphipathic helices in lipid bilayers.Protein Sci. 2003 Nov;12(11):2597-605.PubMed [citation] PMID: 14573870, PMCID: PMC236694
4. Li, C., Mo, Y., Hu, J., Chekmenev, E., Tian, C., Gao, F.P., Fu, R., Gor'kov, P., Brey, W., Cross, T.A., Analysis of RF heating and sample stability in aligned static solid-state NMR spectroscopy.J Magn Reson. 2006 May;180(1):51-7. Epub 2006 Feb 17.PubMed [citation] PMID: 16483809

Drug Discovery

1. Wu, X., Lan, L., Wilson, D.M., Marquez, R.T., Tsao, W.C., Gao, P., Roy, A., Turner, B.A., McDonald, P., Tunge, J.A., Rogers, S.A., Dixon, D.A., Aubé, J., Xu, L., Identification and Validation of Novel Small Molecule Disruptors of HuR-mRNA Interaction. ACS Chem Biol. 2015 Jun 19;10(6):1476-84. doi: 10.1021/cb500851u. Epub 2015 Mar 17. PMID:25750985
2. Naik, S., Zhang, N., Gao, P., Fisher, M.T., On the design of broad based screening assays to identify potential pharmacological chaperones of protein misfolding diseases.Curr Top Med Chem. 2012 Nov 1; 12(22): 2504-22.PubMed [citation] PMID: 23339304
3. Hu, J., Sharma, M., Qin, H., Gao, F.P., Cross, T.A., Ligand binding in the conserved interhelical loop of CorA, a magnesium transporter from Mycobacterium tuberculosis.J Biol Chem. 2009 Jun 5;284(23):15619-28. doi: 10.1074/jbc.M901581200. Epub 2009 Apr 3.PubMed [citation] PMID: 19346249, PMCID: PMC2708858

Electrophysiology

1. Vijayvergiya, V., Wilson, R., Chorak, A., Gao, P.F., Cross, T.A., Busath, D.D., Proton conductance of influenza virus M2 protein in planar lipid bilayers.Biophys J. 2004 Sep;87(3):1697-704.PubMed [citation] PMID: 15345548, PMCID: PMC1304574
2. Hughes, T., Strongin, B., Gao, F.P., Vijayvergiya, V., Busath, D.D., Davis, R.C., AFM visualization of mobile influenza A M2 molecules in planar bilayers. *Biophys J.* 2004 Jul; 87(1):311-22. PMC1304352
3. Moffat, J.C., Vijayvergiya, V., Gao, P.F., Cross, T.A., Woodbury, D.J., Busath, D.D., Proton transport through influenza A virus M2 protein reconstituted in vesicles. Biophys J. 2008 Jan 15;94(2):434-45. Epub 2007 Sep 7.PubMed [citation] PMID: 17827230, PMCID: PMC2157240

Link to Publication

http://www.ncbi.nlm.nih.gov/sites/myncbi/1jiKfs7JiiUAK/bibliograpahy/43731079/public/?sort=date&direction=ascending

D. Research Support

Ongoing Research Support:

P30GM110761 (PI: R. P. Hanzlik) 04/14/2014 – 03/31/2019
COBRE - National Institutes of Health
The goal of this Center is to provide research support, mentoring and enhanced research infrastructure that will facilitate the development of young faculty investigators working in the area of protein structure and function and enhance their competitiveness for major independent research grant support.
Role: Core Director - Protein Structure and Function

P20GM103638 (PI: S. Lunte) 07/01/2012 – 06/30/2017
National Institutes of Health/NIGMS
Molecular Analysis of Disease Pathways

This COBRE has been recently funded to establish a multidisciplinary research center with the goal of developing exciting new methodologies for the investigation of the molecular basis of disease.
Role: Core Advisor

R01CA178831 (PI: L. Xu) 04/01/2014 – 3/31/2019
National Institutes of Health
Small Molecule Modulating RNA Binding Protein Msi
The objective is the development and characterization of inhibitors for the RNA-binding protein HuR in an effort to identify cancer therapeutics.
Role: Lab Director

R01CA191785 (MPIs: Xu and Aubé) 07/01/2015 – 06/30/2020
National Institutes of Health
Molecular cancer therapy targeting HuR-ARE interaction
The major goal of this proposal is to obtain small molecule inhibitors as chemical probes that potently bind to HuR and modulate its functions, and ultimately select 1-2 most drug-like lead compounds for further development as a new class of molecular cancer therapy that inhibit cancer with HuR overexpression.
Role: Co-I

<u>Recently Completed Support:</u>
D12A-003-0016 (Petillo/Richter) 10/01/2013 – 09/30/2015
Applications and Methods for Continuous Monitoring of Physiological Chemistry
The goal of this project is to develop a platform methodology to screen, clone, evolve and stabilize oxidase enzymes for the measurement of metabolic biomarkers via biosensors.
Role: subaward PI

R44DA033701 (PI: Petillo/Richter) 09/30/2013 – 08/31/2015
National Institutes of Health/ NIDA
Development of a Nicotine Biosensor
The goal of this project is to evolve and develop a Nicotine oxidase for the measurement of nicotin via biosensor.
Role: Lab Director

No number (PI: Lovell) 07/01/2011 – 12/30/2014
CHDI Foundation
Structural Studies of HDAC4:MEF2 for Lead Identification of Protein-Protein Interaction Inhibitors
The specific goals of the project is express, purify and characterize and crystallize the HDAC4 and MEF2 protein, and screen for fragment/ligand of an HDAC4:MEF2 complex
Role: Co-Investigator

HHSN272200900033C (PI: S.A. David) 09/30/2009 – 03/31/2014
National Institutes of Health/NIAIH
Innate Immune Receptors and Adjuvant Discovery
One of the specific goals of the contract is to examine the tryptic peptides of TLR5-agonistic flagellin, and characterization of potential post-translational modifications in such peptides. Large amount of flagellin from E. coli, Semanella and Shigella will be produced at the Protein Production Core Lab in the first two years.
Role: Co-Investigator

FP0065652 (PI: J. Karanicolas) 10/01/2009 - 09/30/2010
Institute for Advancing Medical Innovation (IAMI)
Design of a Stabilized Ricin Vaccine
The goal of the proposal is to engineer variants of the ricin toxin A-chain through rational mutations to the protein core and develop a stable antigen. The Protein Production Core Lab will mutate, express, and purify the proteins designed by computational techniques.
Role: Co-Investigator