CURRICULUM VITAE
PALLAV KOSURI

Columbia University
Department of Biological Sciences
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EDUCATION

Ph.D. Program in Biochemistry and Molecular Biophysics, 2006-2012
Columbia University, New York

- Thesis topic: Novel methods for detection of single-molecule enzyme reactions
- Thesis adviser: Julio M. Fernandez, Ph.D., Department of Biological Sciences
- Developed a Single Molecule Atomic Force Microscope, currently commercially available, manufactured under exclusive license by Luigs&Neumann GmbH

M.S., Engineering Physics (co-terminal program, B.S./M.S.), 2001-2005
Royal Institute of Technology (KTH), Stockholm, Sweden

Thesis research at the European Center for Nuclear Research (CERN), Geneva, Switzerland

- Thesis title: "Operation and Development of the Resonant Ionization Laser Ion Source at ISOLDE, CERN"
- Thesis advisers: Valentin N. Fedosseev, Ph.D., Senior Physicist, CERN; Lars-Erik Berg, Ph.D., Department of Chemical Physics, KTH

Supplementary coursework:

- Molecular Biology & Neuroscience, Karolinska Institutet
- Psychology, Stockholm University

HONORS AND AWARDS

Titus M. Coan Prize for Excellence in Basic Research, 2012
Columbia Technology Ventures Seed Fund Award, "Novel Enzymes for Use in Biofuel Production", 2011
Fulbright Scholarship, 2006-2011
Henrik Göransson Sandviken Foundation Scholarship, 2005
Dean's Award, KTH Royal Institute of Technology (top 3% of graduating class), 2005

RESEARCH EXPERIENCE

Columbia University

Lab of Julio Fernandez, 2007-present

- Single-molecule biochemistry using force spectroscopy and fluorescence microscopy

Lab of Eric Greene, rotation, 2007

- Constructed dual optical tweezers for use in single molecule studies of DNA repair proteins

Lab of Ruben Gonzalez, rotation, 2007

- Developed a rigorous method for analysis of smFRET data using Hidden Markov Modeling; smFRET studies of the L1 ribosomal protein's function and dynamics during translation

Lab of Arthur Palmer, rotation, 2006

- Used novel NMR relaxation dispersion methods to study the dynamics of the protein HP-67

European Center for Nuclear Research (CERN)

The ISOLDE nuclear experiment facility for on-line isotope separation, M.S. thesis work, 2005

- Operation of the Resonant Ionization Laser Ion Source (RILIS) during nuclear experiments; Development of a technical upgrade of the laser ion source; Theoretical study of laser ionization spectroscopy of atomic gold for nuclear experiments (currently in use)

TEACHING EXPERIENCE

Cellular Physiology of Disease W4008, Columbia University, 2010
Experimental Biophysics (Graduate Level), Tel Aviv University, 2009
Cellular Physiology of Disease W3008, Columbia University, 2008
Molecular Biophysics G4250, Columbia University, 2007
Instructor, Arena Diving, SK Neptun, 2005
Substitute Teacher, Enskede High School, 2004

EXTRACURRICULAR ACTIVITIES

EVP of Operations, InSITE Startup & VC advising, New York City, 2012-
Fellow, InSITE Startup & VC advising, New York City, 2011
Research Fellow, Columbia Technology Ventures, 2010-
President, Graduate Student Organization, Columbia University Medical Center, 2007-2008
Project leader, Nobel Nightcap (part of the Nobel Prize festivities), 2004
Documentary photographer, IDG Publishing, (http://www.pallavkosuri.com) 2005-2006
Classical guitarist, skydiver

PRESENTED WORKS

Amyloid-β peptides enhance spontaneous calcium signaling in astrocytes, Society for Neuroscience, 2011

Introducing Paleoenzymology: A Study of Ancient Enzymes Using Single-Molecule AFM, Invited talk, Dept. of Biochemistry and Molecular Biophysics, Columbia University, 2011

Single atom switch of enzyme function during oxidative folding, Gordon Research Conference, 2010

Direct observation of reduction and oxidation of single disulfide bonds, Invited talk, Dept. of Chemistry, Columbia University, 2010

Mechanism of disulfide reduction by the acidophilic reductase GILT, Biophysical Society Meeting, 2010

Paleoenzymology at the single-molecule level: Probing the chemistry of resurrected enzymes with force-clamp spectroscopy, Biophysical Society Meeting, 2010

Monitoring single disulfide reactions, Invited talk, Dept. of Biological Sciences, Columbia University, 2009

Kalman filter estimates of the contour length of an unfolding protein in single-molecule force spectroscopy experiments, Biophysical Society Meeting, 2009

Tracking of Qdot conjugated titin antibodies in single myofibril stretch experiments reveals Ig-domain unfolding at physiological sarcomere lengths, Biophysical Society Meeting, 2009

Diversity of chemical mechanisms in thioredoxin catalysis revealed by single-molecule force spectroscopy, Biophysical Society Meeting, 2009

Chemical exchange methods for characterizing protein folding intermediates, Experimental Nuclear Magnetic Resonance Conference, 2007

Structural dynamics of the L1 protuberance during translation, International Conference on Ribosomes, 2007

PATENTS

Force-clamp spectrometer and methods of use, PCT/US2011/044084
Ancestral proteins, PCT/US2011/044275

PUBLICATIONS

Protein folding drives disulfide formation, Kosuri P, Alegre-Cebollada J, Kaplan A, Ingles-Prieto A, Badilla C, Stockwell BR, Sanchez-Ruiz JM, Holmgren A, Fernandez JM, *submitted*

Cellular signaling regulates protein mechanics, Kosuri P, Alegre-Cebollada J, Fernandez JM, *in preparation*

Mechanical Tuning of a Catalytic Cysteine pKa in Thioredoxin, Kosuri P, Chen B, Holmgren A, Fernandez JM, *in preparation*

Direct observation of disulfide isomerization in a single protein, Alegre-Cebollada J, Kosuri P, Rivas-Pardo JA, Fernández JM, **Nature Chemistry** 3:882-7 (2011)

Protease power strokes force proteins to unfold, Alegre-Cebollada J, Kosuri P, Fernandez JM, **Cell** 145:339-340 (2011)

Single-molecule paleoenzymology probes the chemistry of resurrected enzymes, Perez-Jimenez R, Ingles-Prieto A, Zhao Z, Sanchez-Romero I, Alegre-Cebollada J, Kosuri P, Garcia-Manyes S, Kappock TJ, Tanokura M, Holmgren A, Sanchez-Ruiz JM, Gaucher EA, Fernandez JM, **Nature Structural & Molecular Biology**, 18:592-596 (2011)

Kalman filter estimates of the contour length of an unfolding protein in single-molecule force spectroscopy experiments, Fernandez VI, Kosuri P, Parot P, Fernandez JM, **Review of Scientific Instruments** 80:113104 (2009)

Single-molecule force spectroscopy approach to enzymatic catalysis, Alegre-Cebollada J, Perez-Jimenez R, Kosuri P, Fernandez JM, **Journal of Biological Chemistry**, 285:18961-6 (2009)

Partially folded equilibrium intermediate of the villin headpiece HP67 defined by ^{13}C relaxation dispersion, O'Connell NE, Grey MJ, Tang Y, Kosuri P, Miloushev VZ, Raleigh DP, Palmer AG, **Journal of Biomolecular NMR**, 45:85-98 (2009)

Diversity of chemical mechanisms in thioredoxin catalysis revealed by single-molecule force spectroscopy, Perez-Jimenez R, Li J, Kosuri P, Berne BJ, Fernandez JM, **Nature Structural & Molecular Biology**, 16:890-6 (2009)

Force-clamp spectroscopy detects residue co-evolution in enzyme catalysis, Perez-Jimenez R, Wiita AP, Rodriguez-Larrea D, Kosuri P, Gavira JA, Sanchez-Ruiz JM, Fernandez JM, **Journal of Biological Chemistry**, 283:27121-29 (2008)

Coupling of ribosomal L1 stalk and tRNA dynamics during translation elongation, Fei J, Kosuri P, MacDougall DD, Gonzalez RL, **Molecular Cell**, 30:348-359 (2008)

Development of a RILIS ionisation scheme for gold at ISOLDE, CERN, Marsh BA, Fedosseev VN, Kosuri P, **Hyperfine Interactions**, 171:109-116 (2006)