

## Elsa Chui-Ying Yan

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### EDUCATION

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- OCT 2000**      **Columbia University**      **New York, NY**
- Ph.D. (Distinction) in Physical Chemistry  
Advisor: Dr. Kenneth B. Eisenthal  
Thesis Title: *Second Harmonic Generation as a Surface Probe for Colloidal Particles*
- FEB 1999**      **Columbia University**      **New York, NY**
- M.Phil.
- OCT 1996**      **Columbia University**      **New York, NY**
- M.A.
- OCT 1995**      **Chinese University of Hong Kong**      **Hong Kong**
- B.Sc. (First Class Honors) in Chemistry

### HONORS AND AWARDS

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1. **Individual National Research Service Award (F32 EY014308-01)**, Proposal title: *Structure and Dynamics of the Primary Event in Vision*, National Institutes of Health, Bethesda, MD, 2003. [Note: **Priority Score: 101**. Not activated due to a delay issue of I-55 (Green) Card]
2. **Distinction for Doctor of Philosophy**, Columbia University, New York, NY, 2000.
3. **Pegram Award for excellent achievement in graduate research**, Columbia University, New York, NY, 2000.
4. **Graduate Faculty Fellowship**, Columbia University, New York, NY, 1995-2000.
5. **Sir Edward Youde Memorial Scholarship for outstanding academic achievement**, Sir Edward Youde Memorial Fund Council, Hong Kong, 1994.
6. **First Prize in the Chemistry Olympiad**, Hong Kong Chemical Society and UK Royal Society of Chemistry, 1993.
7. **First Class Honors for Bachelor Degree of Science**, Chinese University of Hong Kong, Hong Kong, 1995.
8. **Full Scholarship**, the 11th International Conference on Retinal Proteins, Frauenchiemsee, Germany, 2004.
9. **Travel Award**, the 31st Annual Meeting, American Society for Photobiology, 2003.
10. **Summer Research Travel Award**, Summer Conference: The Biology and Chemistry of Vision, The Federation of American Society for Experimental Biology, 2003.

### RESEARCH EXPERIENCE

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**2007-**                      **Yale University**                      **New Haven, CT**  
***Assistant Professor of Chemistry***

Elucidate the activation mechanism of G protein-coupled receptors by a combination of techniques in laser spectroscopic, molecular biology and chemical biology.

**2004-2007**                      **Rockefeller University**                      **New York, NY**  
***Research Assistant Professor***

Investigated the disease state of rhodopsin and implement a novel mammalian expression system that routinely expresses G protein-coupled receptor rhodopsin in milligram scale for biophysical studies.

**2000-2004**                      **University of California, Berkeley**                      **Berkeley, CA**

***Postdoctoral Fellow with Prof. Richard A. Mathies***

**Rockefeller University, HHMI**                      **New York, NY**

***Visiting Fellow with Prof. Thomas P. Sakmar***

Investigated the photoactivation mechanism of visual pigment via studying protein and chromophore structures with a multidisciplinary approach that integrates Raman spectroscopy, mutagenesis, Density Functional Theory calculation and bioinformatic analysis.

**1996-2000**                      **Columbia University**                      **New York, NY**

***Graduate Research Assistant with Prof. Kenneth B. Eisenthal***

Innovated and extend the application of the surface specific second-order spectroscopic technique of second harmonic generation (SHG) from planar surfaces to microscopic colloidal surfaces.

## **TEACHING EXPERIENCE**

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**2008 Spring**    **Yale University, New Haven, CT**

- Led discussion sections in freshman science course of *Perspectives on Sciences*

**2007 Fall**        **Yale University, New Haven, CT**

- Designed syllabus and lectured an upper-level undergraduate course of *Physical Chemistry with Applications in Life Sciences*

**2005 Fall**        **Hunter College, City University of New York, New York, NY**

***Adjunct Assistant Professor***

- Designed syllabus and lectured an upper-level undergraduate course of *Biophysical Chemistry*

**1996-1998**        **Columbia University, New York, NY**

***Teaching Assistant***

- Planned and led recitations for two upper-level undergraduate courses of *Physical Chemistry* (Lecturer: Prof. George Flynn) and a graduate course of *Statistical Thermodynamics* (Lecturer: Prof. Bruce Berne)

## **PUBLICATIONS**

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1. Wu, C.; **Yan, C.Y.** "Studies of the Swelling and Drying Kinetics of Thin Gel Films by In-Situ Interferometry" *Macromolecules* 27, 4516, **1994**.
2. Wang, H.; **Yan, E.C.Y.**; Borguet, E.; Eisenthal, K.B. "Second Harmonic Generation from the Surface of Centrosymmetric Particles in Bulk Solution" *Chem. Phys. Letts.* 259, 15, **1996**.
3. Wang, H.; Borguet, E.; **Yan, E.C.Y.**; Zhang, D.; Gutow, J.; Eisenthal, K.B. "Molecules at Liquid and Solid Surfaces" *Langmuir* 14, 1472, **1998**.
4. Wang, H.; **Yan, E.C.Y.**; Liu, Y.; Eisenthal, K.B. "Energetics and Population of Molecules at Microscopic Liquid and Solid Surfaces" *J. Phys. Chem.* 102, 4446, **1998**.
5. **Yan, E.C.Y.**; Liu, Y.; Eisenthal, K.B. "New Method for Determination of Surface Potential of Microscopic Particles by Second Harmonic Generation" *J. Phys. Chem. B* 102, 6331, **1998**.
6. **Yan, E.C.Y.**; Eisenthal, K.B. "Probing the Interface of Microscopic Clay Particles in Aqueous Solution by Second Harmonic Generation" *J. Phys. Chem. B.* 103, 6056, **1999**.
7. **Yan, E.C.Y.**; Eisenthal, K.B. "Rotational Dynamics of Anisotropic Particles Studied by Second Harmonic Generation" *J. Phys. Chem. B.* 104, 6686, **2000**.
8. **Yan, E.C.Y.**; Eisenthal, K.B. "Effects of Cholesterol on Molecular Transport of Organic Cations across Liposome Bilayers Probed by Second Harmonic Generation" *Biophys. J.* 79, 898, **2000**.
9. Liu, Y.; **Yan, E.C.Y.**; Eisenthal, K.B. "Effect of Lipid Composition on Molecular Adsorption and Transport across Liposome Bilayers" *Biophys. J.* 80, 1004, **2001**.

10. Liu, Y.; **Yan, E.C.Y.**; Zhou, X. L.; Eienthal, K.B. "Surface Potential of Charged Liposomes Determined by Second Harmonic Generation" *Langmuir* 17, 2063, **2001**.
11. **Yan, E.C.Y.**; Liu, Y.; Eienthal, K.B. "In-situ Studies of Molecular Transfer between Colloidal Surfaces by Second Harmonic Generation" *J. Phys. Chem. B.* 105, 8531, **2001**.
12. Shang, X.; Liu, Y.; **Yan, E.**; Eienthal, K.B. "Effect of Counterions on Molecular Transport across Liposome Bilayer: Probed by Second Harmonic Generation" *J. Phys. Chem. B.* 105, 12816, **2001**.
13. **Yan, E.C.Y.**; Kazmi, M.A.; De, S.; Chang, S.W.; Seibert, C.; Marin, E.P.; Mathies, R.A.; Sakmar, T.P. "Function of Extracellular Loop 2 in Bovine Rhodopsin: Glutamic Acid 181 Modulates Stability and Wavelength Maximal Absorption of Metarhodopsin II" *Biochemistry* 41, 3620, **2002**.
14. **Yan, E.C.Y.**; Kazmi, M.A.; Gamin, Z.; Hou, J. M.; Pan, D.; Chang, B.S.W.; Sakmar, T. P.; Mathies, R. A. "Counterion Switch in the Photoactivation of G Protein-Coupled Receptor Rhodopsin" *Proc. Natl. Acad. Sci. U.S.A.* 100, 9262, **2003**.  
**Commentary by Birge, R.B. and Knox, B.E.** "Perspectives on the counterion switch-induced photoactivation of the G protein-coupled receptor rhodopsin" *Proc. Natl. Acad. Sci. U.S.A.* 100, 9105, **2003**.
15. **Yan, E.C.Y.**; Gamin, Z.; Kazmi, M.A.; Chang, B.S.W.; Sakmar, T. P.; Mathies, R. A. "Resonance Raman Analysis of the Mechanism of Energy Storage and Chromophore Distortion in the Primary Visual Photoproduct" *Biochemistry* 43, 10867, **2004**.
16. Ludeke, S.; Beck, M.; **Yan, E.C.Y.**; Sakmar, T.P.; Siebert, F.; Vogel, R. "The Role of Glu181 in the Photoactivation of Rhodopsin." *J. Mol. Biol.* 353, 245, **2005**.
17. Vogel, R.; Siebert, F; **Yan, E.C.Y.**; Sakmar, T.P.; Hirshfeld, A.; Sheves, M. "Modulating Rhodopsin Receptor Activation by Altering the pK<sub>a</sub> of the Retinal Schiff Base" *J. Am. Chem. Soc.* 128, 10503, **2006**.
18. **Yan, E.C.Y.\***; Lewis, J.W.; Szundi, I; Epps, J.; Bhagat, A.; Kliger, D.S. "Photointermediates of the Rhodopsin S186A Mutant as a Probe of the Hydrogen Bond Network in the Chromophore Pocket and Counterion Switch" Invited Paper, In Press, *J. Phy. Chem. C.*, **2007**.
19. Ye, S.; Köhrer, C.; Huber, T.; Kazmi, M.; **Yan, E.C.Y.**; Sachdev, P.; Bhagat, A.; RajBhandary, U.L.; Sakmar, T.P. "Site-specific Incorporation of Keto Amino Acids Into Functional G Protein-Coupled Receptors Using Unnatural Amino Acid Mutagenesis" *J. Biol. Chem.* 283, 1525, **2007**.

## **SELECTED PRESENTATIONS**

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1. *Effect of Cholesterol on Molecular Transport across Liposome Bilayers.* The 218th American Chemical Society National Meeting, New Orleans, LA, **1999**.
2. *Molecular Adsorption and Transport across Membrane-Like Bilayer Structure.* Annual American Physical Society Meeting, Minneapolis, MN, **2000**.
3. *Structural Functioning of Visual Pigment Studied by Techniques of Molecular Biology and Raman Spectroscopy.* Institute of Chemistry, Chinese Academy of Science, Beijing, China, **2001**.
4. *Counterion Switch in the Photoactivation of G Protein-Coupled Receptor Rhodopsin.* Federation of American Society for Experimental Biology, Summer Research Conference: The Biology and Chemistry of Vision, Tucson, AZ, **2003**.
5. *Counterion Switch in the Photoactivation of G protein-Coupled Receptor Rhodopsin.* The 31st Annual Meeting of the American Society for Photobiology, Baltimore, MD, **2003**.
6. *Photoactivation Mechanism of G Protein-Coupled Receptor Rhodopsin.* Department of Chemistry, Columbia University, New York, NY, **2004**.
7. *Photoactivation of G Protein-Coupled Receptor Rhodopsin.* Department of Physiology and Biophysics, Cornell University, Joan and Sanford Weill Medical College, New York, NY, **2004**.
8. *Photoactivation Mechanism of Rhodopsin: Energy Storage in the Primary Event and the Counterion Switch.* The 11th International Conference on Retinal Proteins, Frauenchiemsee, Germany, **2004**.

9. *Counterion Switch and H-Bond Network in Rhodopsin Signaling Process*. The 10<sup>th</sup> Annual Vision Research Conference, Ft Lauderdale, FL, **2006**.
10. *Counterion Switch and H-Bond Network in Rhodopsin Signaling Process*. The 2006 G Protein Signaling Workshop, Philadelphia, PA, **2006**.
11. *Photoactivation of G Protein-Coupled Receptor Rhodopsin*. Department of Chemistry, Northwestern University, Evanston, IL, **2006**.
12. *Photoactivation of G Protein-Coupled Receptor Rhodopsin*. Department of Chemistry, University of Pennsylvania, Philadelphia, PA, **2006**.
13. *Photoactivation of G Protein-Coupled Receptor Rhodopsin*. Department of Chemistry, Cornell University, Ithaca, NY, **2007**.
14. *Photoactivation of G Protein-Coupled Receptor Rhodopsin*. Department of Chemistry, John Hopkins University, Baltimore, MD, **2007**.
15. *Effect of the D190N Mutation of Rhodopsin: Structure and Biochemistry*. Edward S. Harkness Eye Institute, College of Physicians & Surgeons, Columbia University Medical Center, New York, NY, **2007**.
16. *Photoactivation of G Protein-Coupled Receptor Rhodopsin*. The International Symposium on the Recent Progress in Optical Spectroscopy and Its Applications, Hong Kong, PR China, **2007**.
17. *Photoactivation of G Protein-Coupled Receptor Rhodopsin*. Department of Chemistry, University of Massachusetts, Dartmouth, NY, **2008**.
18. *Photoactivation of G Protein-Coupled Receptor Rhodopsin*. Department of Chemistry, City College, City University of New York, New York, NY, **2008**.
19. *Photoactivation of G Protein-Coupled Receptor Rhodopsin*. Department of Chemistry, Seton Hall University, South Orange, NJ, **2008**.

## **PANEL DISCUSSION**

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1. Panelist, Preparing Future Faculty Colloquium: On the Academic Profession, Graduate School of Art and Science, Columbia University, New York, NY, Mar 2007
2. Panelist, The Yale Post-Doctoral Career Development Lecture Series: Academic Job Search-Identifying Opportunity and Preparing a Successful Application, Yale University, New Haven, CT, Oct 2007.

## **PROFESSIONAL MEMBERSHIPS AND SERVICE**

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- Member of American Association for the Advancement of Science (AAAS)
- Member of American Chemical Society (ACS)
- Member of Protein Society
- Reviewer for *Langmuir*
- Reviewer for *Journal of American Chemical Society*
- Reviewer for *Biochemistry*
- Reviewer for *Photochemistry and Photobiology*
- Reviewer for *Journal of Molecular Biology*
- Reviewer for *Europhysics Letters*