

## Ding-Shyue (Jerry) Yang

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### Education

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- Ph.D. Chemistry (GPA 4.2/4.0), **California Institute of Technology**, Pasadena, CA (05/2009)
- M.S. Chemistry (GPA 4.0/4.0), **National Taiwan University**, Taipei, Taiwan (06/1999)  
Dean of College of Science Award
- B.S. Chemistry (GPA 4.0/4.0), **National Taiwan University**, Taipei, Taiwan (06/1997)  
with minor in Mathematics  
7 University Presidential Awards (1993–97), *graduated summa cum laude*

### Awards and Honors

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- Welch Professorship, Welch Foundation & Texas Center for Superconductivity at UH (2013–14)
- Herbert Newby McCoy Award, Chemistry Division, Caltech (2009)
- Phi Tau Phi Scholarship, Phi Tau Phi Scholastic Honor Society, West America Chapter (2009)
- Lecturer**, Everhart Lecture Series, Caltech (2008)
- National** Outstanding Graduate Research Award, National Cultural Association, Taiwan (2000)
- Yen Thesis Award, Chemistry Department, NTU (1999)
- Yuan-Tze Lee (Nobel Laureate) Scholarship, Taiwan (1993–97)
- Awardee**, Ten Outstanding Adolescents of the Worldwide Chinese (1993)
- Full Tuition Scholarships for **National** Gifted Students in Fundamental Science, Taiwan (1993–97)
- Gold Medal**, 25<sup>th</sup> International Chemistry Olympiad, Italy (1993)

### Appointments

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Assistant Professor	Department of Chemistry, <b>University of Houston</b>	09/2012 – present
Scientist	Prof. Zewail group, Chemistry, <b>Caltech</b>	08/2010 – 05/2012
Postdoctoral Scholar	Prof. Zewail group, Chemistry, <b>Caltech</b>	08/2009 – 07/2010
Research Assistant	Prof. Zewail group, Chemistry, <b>Caltech</b>	04/2003 – 06/2009
Research Assistant	Prof. Jin group, Chemistry, <b>National Taiwan University</b>	05/2001 – 08/2002
Airman	Compulsory military service, Air Force of Taiwan	09/1999 – 05/2001
Research Assistant	Prof. Jin group, Chemistry, <b>National Taiwan University</b>	09/1997 – 06/1999

### Publications

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#### Peer-reviewed journal papers

1. X. He, C. Y. Wu, K. Rajagopal, N. Punpongjareorn, D.-S. Yang\*, “Ordered Ionic Liquid Structure Observed at Terraced Graphite Interfaces,” *Phys. Chem. Chem. Phys.* 18, 3392-3396 (2016).
2. D.-S. Yang, O. F. Mohammed, A. H. Zewail, “Environmental Scanning Ultrafast Electron Microscopy: Structural Dynamics of Solvation at Interfaces,” *Angew. Chem. Int. Ed.* 52, 2897-2901 (2013).

### Peer-reviewed journal papers (cont.)

3. O. F. Mohammed, D.-S. Yang, S. K. Pal, A. H. Zewail, "4D Scanning Ultrafast Electron Microscopy (S-UEM): Visualization of Materials Surface Dynamics," *J. Am. Chem. Soc.* 133, 7708-7711 (2011).
4. D.-S. Yang, O. F. Mohammed, A. H. Zewail, "Scanning Ultrafast Electron Microscopy," *Proc. Natl. Acad. Soc. USA* 107, 14993-14998 (2010).
5. D.-S. Yang, A. H. Zewail, "Ordered Water Structure at Hydrophobic Graphite Interfaces Observed by 4D, Ultrafast Electron Crystallography," *Proc. Natl. Acad. Soc. USA* 106, 4122-4126 (2009).
6. F. Carbone, D.-S. Yang, E. Giannini, A. H. Zewail, "Direct Role of Structural Dynamics in Electron-lattice Coupling of Superconducting Cuprates," *Proc. Natl. Acad. Soc. USA* 105, 20161-20166 (2008); **highlighted in** "[This Week in PNAS](#)."
7. D.-S. Yang, C. Lao, A. H. Zewail, "4D Electron Diffraction Reveals Correlated Unidirectional Behavior in Zinc Oxide Nanowires," *Science* 321, 1660-1664 (2008).
8. P. Baum, D.-S. Yang, A. H. Zewail, "4D Visualization of Transitional Structures in Phase Transformations by Electron Diffraction," *Science* 318, 788-792 (2007); **highlighted in** "[Perspective Review](#)."
9. J. Tang, D.-S. Yang, A. H. Zewail, "Ultrafast Electron Crystallography. 3. Theoretical Modeling of Structural Dynamics," *J. Phys. Chem. C* 111, 8957-8970 (2007).
10. N. Gedik, D.-S. Yang, G. Logvenov, I. Bozovic, A. H. Zewail, "Nonequilibrium Phase Transitions in Cuprates Observed by Ultrafast Electron Crystallography," *Science* 316, 425-429 (2007).
11. D.-S. Yang, N. Gedik, A. H. Zewail, "Ultrafast Electron Crystallography. 1. Nonequilibrium Dynamics of Nanometer-scale Structures," *J. Phys. Chem. C* 111, 4889-4949 (2007); **highlighted in** "[Cover Story](#)."
12. C.-Y. Ruan, D.-S. Yang, A. H. Zewail, "Structures and Dynamics of Self-assembled Surface Monolayers Observed by Ultrafast Electron Crystallography," *J. Am. Chem. Soc.* 126, 12797-12799 (2004).
13. D. H. Paik, I.-R. Lee, D.-S. Yang, J. S. Baskin, A. H. Zewail, "Electrons in Finite-sized Water Cavities: Hydration Dynamics Observed in Real Time," *Science* 306, 672-675 (2004).
14. D. H. Paik, D.-S. Yang, I.-R. Lee, A. H. Zewail, "The Transition State of Thermal Organic Reactions: Direct Observation in Real Time," *Angew. Chem. Int. Ed.* 43, 2830-2834 (2004).

### Conference proceeding and abstract papers

1. P. Baum, D.-S. Yang, A. H. Zewail, "Four-dimensional Visualization of Transitional Structures in Phase Transformations by Electron Diffraction," *Ultrafast Phenomena XVI in Springer Series in Chemical Physics* 92, 116-118 (2009).
2. B.-Y. Jin, D.-S. Yang, "Theoretical Study of Photoinduced Electron Transfer in a Molecularly Doped Conjugated Polymer: The Effect of Lattice Relaxation," *Abstr. Paper Am. Chem. Soc.* 218, U344 (1999).

### Dissertations

- Ph.D. Title: "Ultrafast Electron Crystallography: Principles and Applications"  
Advisor: Prof. Ahmed H. Zewail (Nobel Laureate)
- M.S. Title: "Lattice relaxation theory of photoinduced charge transfer in a molecularly doped conjugated polymer" (theoretical work)  
Advisor: Prof. Bih-Yaw Jin

## Research Experience

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### **Time-resolved Scanning Electron Microscopy** 08/2009 – Present

The newly developed technique is capable of real-space surface imaging of photoinduced dynamical processes in condensed matter and at interfaces under different vacuum conditions. I incorporated an ultrashort time scale into scanning electron microscopy and discovered the two regimes of dynamical probing possible. I observed solvation dynamics by adsorbate molecules at interfaces.

### **Electronic and Structural Dynamics in Condensed Matter and at Interface** 04/2004 – Present

I applied the technique of time-resolved electron diffraction to the studies of photoinduced electronic and structural dynamics of materials, interfacial water assemblies, and self-assembled monolayers. I demonstrated the principles that govern the experimental observables and the physical processes at work. Further applications included the investigation of strongly correlated materials such as high- $T_c$  superconductors and those exhibiting phase transitions, structurally intriguing solids such as graphite and perovskite structures, and nanometer-scale materials.

### **Ground-state Dynamics and Mesoscopic Solvation in Gas Phase** 04/2003 – 07/2004

We applied the time-resolved photoelectron spectroscopy and negative-ion-beam techniques to the studies of the dynamics of solvated electron in size-selected water clusters and the ground-state dynamics (ring-inversion motion) of cyclooctatetraene. I conducted the theoretical calculations and constructed the framework to explain the experimental observation of cyclooctatetraene.

### **Theoretical Investigation of Carbon Nanotubes and 1-D Metal Chains** 05/2001 – 08/2002

I investigated the formation mechanism, stability, and mechanical property of an experimentally observed triple-stranded carbon nanorope. I also conducted tight-binding calculations for one-dimensional chains of different transition metal ions.

### **Theory of Photoinduced Charge Transfer in Doped Conjugated Polymer** 09/1997 – 06/1999

I developed a microscopic theory with consideration of lattice relaxation for the system of molecularly doped conjugated polymers. I explored the various factors that may affect the charge transfer rate between a molecular dopant and a conjugated polymer.

## Teaching Experience

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CHEM 1372: Fundamentals of Chemistry for Engineers (Fall 2012)

CHEM 4372: Physical Chemistry II — Quantum Mechanics (Fall 2013, Spring 2014–16)

CHEM 6321: Quantum Chemistry (Fall 2014–15)

Teaching Assistant for Dynamics and Complexity in Physical and Life Sciences (Spring 2006),

Introduction to Energy Sciences (Spring 2003), and

General Chemistry (Fall 2002 – Winter 2003), Caltech

Teaching Assistant for Physical Chemistry Laboratory, Department of Chemistry, NTU (1997–98)

## Presentations

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### Invited seminars

1. "Effect of Surface Conditions on Ultrafast Carrier Dynamics of Crystalline CdTe," *SPIE Optics + Photonics, San Diego, CA* (08/12/2015)
2. "Visualization of the Structural Dynamics of Interfacial Molecular Assemblies by Ultrafast Electron Imaging Techniques," *Electron Microscopy Frontiers, KAUST, Saudi Arabia* (12/09/2014)
3. "Environmental Scanning Electron Microscopy: Probing Ultrafast Solvation Dynamics at Interfaces," *Femtosecond Electron Imaging and Spectroscopy 2013, Key West, FL* (12/12/2013)
4. "Time-resolved Electron Imaging of Ultrafast Electronic and Structural Dynamics," *Department of Chemistry and Biochemistry, Baylor University, TX* (02/08/2013)
5. "Structures, Dynamics, and Nonequilibrium Phase Transformations of Water Assemblies at Interfaces," *Institute of Atomic and Molecular Sciences, Academia Sinica, Taiwan* (07/06/2012)
6. "Seeing is Believing: 4D Visualization of Electronic and Structural Dynamics," *Department of Chemistry, National Taiwan University, Taiwan* (05/31/2012)
7. "Seeing is Believing: 4D Visualization of Electronic and Structural Dynamics," *Department of Chemistry and Biochemistry, National Chung Cheng University, Taiwan* (5/22/2012)
8. "Seeing is Believing: Four-dimensional Visualization of Electronic and Structural Dynamics," *Department of Physics, University of Texas at Austin, TX* (02/20/2012)
9. "Seeing is Believing: Visualization of Electronic and Structural Dynamics by Ultrafast Electron Crystallography and Microscopy," *Department of Chemistry, Princeton University, NJ* (12/09/2011)
10. "Seeing is Believing: Visualization of Electronic and Structural Dynamics by Ultrafast Electron Crystallography and Microscopy," *Department of Chemistry, University of Houston, TX* (11/09/2011)
11. "Seeing is Believing: Visualization of Condensed-Matter Structure in Four Dimensions," *Department of Chemistry, National Taiwan University, Taiwan* (10/09/2008).

### Talks

1. "Progress in the Development of Scanning Ultrafast Electron Microscopy," *APS Meeting—California-Nevada Section, Caltech, CA* (10/30/2010)
2. "Nonequilibrium Structural Phase Transformation of Interfacial Water Assemblies Observed by Ultrafast Electron Crystallography," *APS March Meeting, Portland, OR* (03/15/2010)
3. "Seeing is Believing: Visualization of Condensed-Matter Structures in Four Dimensions," *Caltech Everhart Lecture Series, Pasadena, CA* (05/01/2008)
4. "Transitional Structures during Phase Transformations Probed by Ultrafast Electron Diffraction," *APS Meeting—California Section, Berkeley, CA* (10/27/2007)

## Patent

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A. H. Zewail, O.-H. Kwon, O. F. Mohammed, D.-S. Yang, "Method and System for 4D Tomography and Ultrafast Scanning Electron Microscopy," U.S. Patent No. US8,841,613 B2.