
CURRICULUM VITAE

Joseph David Ng

Professor

Department of Biological Sciences, Shelby Center for Science and Technology, Room 369J

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Professional preparation

- The Scripps Research Institute, Sabbatical Leave, 2006
Area of research: Macromolecular crystallization and technology development in X-ray crystallography for structural genomics
- Investigación del CSIC en la Universidad de Granada, Research Fellow, 1998
Area of Research: Bimolecular crystallization
- IBMC, CNRS, Strasbourg, France, Postdoctoral fellow, 1993-1998
Area of Research: Macromolecular crystal growth of RNA and nucleic acid binding proteins, X-ray crystallography
- University of California, Riverside, Biochemistry, Ph.D. 1992
Area of Research: Molecular biology applications toward X-ray structure investigations
- University of California, Los Angeles, Biochemistry, B.S. 1985
Area of Research: Biophysical studies of membrane vesicles

Appointments

- 2014-present Professor, University of Alabama in Huntsville
- 2008-present President of iXpressGenes Inc at the HudsonAlpha Institute for Biotechnology
- 1998-present Adjunct Professor, Material Science, University of Alabama in Huntsville
- 2004-2020 Biotechnology Science and Engineering Doctoral Program Director
- 2006-2008 President of ExtremoZyme at the University of Alabama in Huntsville
- 2004-2014 Associate Professor, University of Alabama in Huntsville
- 1998-2004 Assistant Professor, University of Alabama in Huntsville

Publications

- González-Ramírez, L.A., Moreno A., **Ng, J.D.** and García-Ruiz, J.M. (2022). Investigations on the Role of Iron (III) and Silica-Iron (III) for DNA Protection Against Highly Intense UV Radiation: Tracking the Connection of Prebiotic Chemistry to Biology. *Astrobiology*. *In press*. (Ahead of print access: <https://doi.org/10.1089/ast.2022.0004>)
- Petroff, A., Weir, R.L., Yates, C.R., **Ng, J.D.** and Baudry, J. (2021). Sequential Dynamics of Stearoyl-CoA Desaturase-1(SCD1)/Ligand Binding and Unbinding Mechanism: A Computational Study. *Biomolecules* **11**:1435
- Havlickova, P., Brinsa, V., Brynda, J., Pacht, P., Prudnikova, T., Mesters, J.R., Kascakova, B., Kutý, M., Pusey, M.L., **Ng, J.D.**, Rezacova, P. and Smananova, I.K. (2019). A novel structurally characterized haloacid dehalogenase superfamily phosphatase from *Thermococcus thio-reducens* with diverse substrate specificity. *Acta Cryst. D* **75**, 743-752.
- Pusey, M., Barcena, J., Morris, M., Singhal, A., Yuan, Q. and **Ng, J.D.** (2015). Trace fluorescent labeling for protein crystallization. *Acta Crystallogr Sect F Struct Biol Cryst Commun*, **71**, 806-814.
- **Ng, J. D.**, Baird, J. K., Coates, L., García-Ruiz, J.M., Hodge, T.A. and Huang, S. (2015). Large volume protein crystal growth for Neutron Macromolecular Crystallography. *Acta Crystallogr Sect F Struct Biol Cryst Commun*, **71**, 358-370.
- Coates, L., Tomanicek, S., Shrader, T., Weiss, K., **Ng, J.D.**, Juttner, P. and Ostermann, A. (2014). Cryogenic neutron protein crystallography: routine methods and potential benefits. *Journal of Applied Crystallography*. **47**:1431-1434.
- Ogungbe, I.V., **Ng, J.D.** and Setzer, W.N. (2013). Interactions of antiparasitic alkaloids with Leishmania protein targets: a molecular docking analysis. *Future Med Chem*. **15**:1777-99.

- **Ng, J.D.**, Dowell, J.J., Kar, A.K., Hansen, K., Thundat, T. and George, M.A. (2013). Measurement of temperature induced unfolding of DNA hairpins by microcantilever sensors. *Open Journal of Applied Biosensor*. 2:78-82.
- Tomanicek, S.J., Standaert, R.F., Weiss, K.L., Ostermann, A., Schrader, T.E., **Ng, J.D.** Coates L. (2013). Neutron and X-ray crystal structures of a perdeuterated enzyme inhibitor complex reveal the catalytic proton network of the Toho-1 β -lactamase for the acylation reaction. *J. Biol. Chem.* 288(7):4715-4722.
- Hughes, R.C., Coates, L., Blakeley, M.P., Tomanicek, S.J., Langan, P., Kovalesvsky, A., García-Ruiz, J.M. and **Ng, J.D.** (2012). Inorganic pyrophosphatase crystals from *Thermococcus thio-reducens* for X-ray and neutron diffraction. *Acta Crystallogr Sect F Struct Biol Cryst Commun* 68:1482-1487.
- Chu, X.Q., Gajapathy, M., Weis, K., Mamontov, E., **Ng, J.D.** and Coates, L. (2012). Dynamic Behavior of Oligomeric Inorganic Pyrophosphatase Explored by Quasielastic Neutron Scattering. *The Journal of Physical Chemistry* 116:9917-9921.
- Kuznetsov, Y.G., Dowell, J.J., Gavira, J.A., **Ng, J.D.** and McPherson, A. (2010). Biophysical and atomic force microscopy characterization of the RNA from satellite tobacco mosaic virus. *Nucleic Acids Research* 38(22):8284-94.
- Tomanicek, S.J., Hughes, R.C., **Ng, J.D.** and Coates, L. (2010). Structure of the endonuclease IV homologue from *Thermotoga maritima* in the presence of active-site divalent metal ions. *Acta Crystallogr Sect F Struct Biol Cryst Commun* 66:1003-1012.
- Kantardjieff, K.A., Lind, C. **Ng, J.D.** and Santarsiero, B.(2010). Efforts to enhance coverage of crystallography in United States secondary education. *J. Applied Crystallography* 43, 1181–1188.
- Otalora, F., Gavira, J.A., **Ng, J.D.**, García-Ruiz, J.M. (2010) Counter-Diffusion Methods Applied to Protein Crystallization. *Progress in Biophysics and Molecular Biology* 101:26-37.
- Hughes, R.C., Tomanicek, S.J., **Ng, J.D.** and Coates, L. (2009). Purification, crystallization and preliminary crystallographic analysis of a thermostable endonuclease IV from *Thermotoga maritima*. *Acta Crystallogr Sect F Struct Biol Cryst Commun*.65:1317-1319.
- Byrne-Steele, M., Hughes, R.C. and **Ng, J.D.** (2009). Recombinant production, crystallization and preliminary X-ray analysis of PCNA from the psychrophilic archaeon *Methanococcoides burtonii* DSM 6242. *Acta Crystallogr F65* :1131-1135.
- Byrne-Steele, M. and **Ng, J.D.** (2009). Expression, purification and preliminary X-ray analysis of proliferating cell nuclear antigen from the archaeon *Thermococcus thio-reducens*. *Acta Crystallogr F65* :906-909.
- Wilson, R.C., Hughes, R.C., Flatt, J.W., Meehan, E.J., **Ng, J.D.** and Twigg, P.D. (2009). Structure of full-length ubiquitin-conjugating enzyme E2-25 K(Huntingtin-interacting protein 2). *Acta Crystallogr Sect F Struct Biol Cryst Commun*. F65:440-444.
- Marsic, D., Flaman, J.M. and **Ng, J.D.** (2008). New DNA polymerase from the hyperthermophilic marine archaeon *Thermococcus thio-reducens*. *Extremophiles* 12:775-788.
- Marsic, D., Hughes, R.C., Byrne-Steele, M.L. and **Ng, J.D.** (2008). PCR-based gene synthesis to produce recombinant proteins for crystallization. *BMC Biotechnology*. 8:44.
- **Ng, J.D.**, Clark P., Stevens, R.C. and Kuhn P. (2008). In situ X-ray analysis of proteins crystals in low birefringent and X-ray transmissive plastic micro-channels. *Acta Crystallogr D Biol Crystallogr* D64:189-197.
- Shaw, N., Tempel W, Chang, J., Yang, H., Cheng, C., **Ng, J.D.**, Rose, J., Rao, Z. Wang, B.C. Liu, Z.J, (2007). Crystal structure solution of a ParB-like nuclease at atomic resolution. *Proteins* 70:263-267.
- **Ng, J.D.**, Stevens, R.C. and Kuhn P. (2008). Protein crystallization in restricted geometry: advancing old ideas for modern times in structural proteomics. *Methods in Molecular Biology* 426:363-376.
- Wilson, R.C., Hughes, R.C., Curto, E.V., **Ng, J.D.** and Twigg, P.D. (2007). Backbone ^1H , ^{15}N , and ^{13}C Resonance Assignments and Secondary Structure of a Novel Protein OGL-20P^T-358 from Hyperthermophile *Thermococcus thio-reducens* sp. nov. *Molecules and Cells* 24:437-440.
- Shaw, N. Cheng, C., Tempel, W. Chang, J. **Ng, J.D.**, Wang, XY, Perrett, S., Rose, J., Rao, Z., Wang, B.C. and Liu, ZJ. (NZ)CH...O contacts assist crystallization of a ParB-like nuclease. *BMC Struct. Biol.* 7:46.
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- Hughes, R.C. and **Ng, J.D.** (2007). Can small laboratories do structural genomics? *Crystal Growth and Design* 7:2226-2238.
- Pradhan, D., Marsic, D., Garriott, O., Meehan, E., and **Ng, J.D.** (2006). Isolation of Novel Alkaliphilic Bacteria from Lake Makat, Tanzania and Recombinant Expression of Two New Proteases. *Proceedings of International Society of Extremophile and their Application* (ISEA, Tokyo, Japan)3:330.
- Caraballo, K.G., Baird, J.K. and **Ng, J.D.** (2006). Kinetics of Supersaturation Decay in the Crystallization of Canavalin. *Crystal Growth and Design*. 6:874-880.
- **Ng, J.D.** and García-Ruiz, J.M. (2006). Counter-diffusion capillary crystallization for structural genomics. *Trends in Drug Discovery* 3:36.
- García-Ruiz, J.M. and **Ng, J.D.** (2006). Counter-diffusion capillary crystallization for high throughput applications. In *Protein crystallization strategies for structural genomics* (N. E. Chayen, ed) International University Line Chapter 5.
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- Bernhardsdotter, E.C.M.J., **Ng, J.D.**, Garriott, O.K. and Pusey, M.L. (2005). Enzymatic properties of an alkaline chelator resistant α -amylase from an alkaliphilic *Bacillus* sp. Isolate L1711. *Process Biochemistry* 40:2401-2408.
- Liu, Z. J.; Shah, A. K.; Habel, J.; **Ng, J. D.**; Kataeva, I.; Xu, H.; Horanyi, P.; Yang, H.; Chang, J.; Huang, L.; Chang, S.; Tempel, W.; Chen, L.; Zhou, W.; Lee, D.; Lin, D.; Zhang, H.; Newton, G.; Rose, J.; Wang, B.-C.(2005). Salvaging *Pyrococcus furiosus* protein targets at SECSG. *J Struct Funct Genomics* 6:121-127.
- Wang, B. C.; Adams, M.; Dailey, H.; DeLucas, L.; Luo, M.; Rose, J.; Bunzell, R.; Dailey, T.; Habel, J.; Horanyi, P. S.; Jenney, F.; Karaveg, K.; Lee, H.-S.; Li, S.; Li, S. C.; T.; Lin, D.; Liu, Z. J.; Luan, C.-H.; Mayer, M.; Nagy, L.; Newton, M. G.; **Ng, J. D.**; Poole, F.; Shah, A. K.; Sugar, F. F.; Xu, H. (2005). Protein production and crystallization at SECSG - An overview. *Journal of Structural and Functional Genomics*. 6:233-43.
- **Ng, J.D.** (2004). DNA to protein and perspectives on protecting the fruits of structural genomic research. *Journal of International Law* 1: 40-42.
- **Ng, J.D.**, Gavira, J.A. and García-Ruiz, J.M. (2003). Protein crystallization by capillary counter-diffusion for applied crystallographic structure determination. *Journal of Structural Biology* 142:218-231.
- Barba-de la Rosa, A. P., **Ng, J.**, Day, J. and McPherson, A. (2003) Structural characterization of satellite tobacco mosaic virus RNA. *Agrocienda* 37, 503-510.
- **Ng, J.D.** (2002). Space grown crystals are more useful for structure determination. *Annals of the New York Academy of Sciences* 974:598-609.
- Lorber, B., Theobald-Dietrich, A., Charron, C., Sauter, C. **Ng, J.D.**, Zhu, D.W. and Giege, R. (2002). From conventional crystallization to better crystals from space: a review on pilot crystallogenesis studies with aspartyl-tRNA synthetases. *Acta Crystallographica* D58: 1674-1680
- Gavira, J.A., López-Jaramillo, J., Toh, D., García-Ruiz, J.M. and **Ng, J.D.** (2002). *Ab initio* crystallographic structure determination of insulin form protein to electron density without crystal handling. *Acta Crystallographica Section D* 58 :1085-1254.
- **Ng, J.D.**, Sauter, C., Lorber, B., Kirkland, N., Arnez, J. and Giegé, R. (2002). Comparative analysis of space- and earth-grown crystals of an aminoacyl-tRNA synthetase: Space-grown crystals are more useful for structural determination. *Acta Crystallographica Section D* 58:645-652.
- Zhu, D.W., Lorber, B., Sauter, C., **Ng, J.D.**, Benas, P., Le Grimellec, C. and Giege, R. (2001). Growth kinetics, diffraction properties, and effect of agarose on the stability of a novel crystal form of T. thermophilus aspartyl-tRNA synthetase-1 *Acta Crystallographica Section D. Acta Cryst.* D57, 552-558.
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- Marsic, D., Pikuta, E.V., Hoover, R. and **Ng, J.D.** (2001). Cloning of the 16S ribosomal RNA gene of a psychrophilic bacterium from the Alaskan Fox Permafrost Tunnel. *Proceedings to the International Society for Optical Engineering: Instruments, Methods and Missions for Astrobiology II* .3755:163-173.
- Roberts, P.H., Zhou, X., Holmes, A., Ranson, H., Small, G., Hemingway, J., **Ng, J.D.**, Chen, L. and Meehan, E.J. (2001). Multi-form crystallization of agGST1-6, a recombinant glutathione S-transferase from a DDT-Resistant strain of *Anopheles gambiae*. *Acta Crystallographica Section D*57:134-136.
- Green, M.E., Kirkland, N. and **Ng, J.D.** (2001). Effect of a mutation at arginine 301 on the stability, crystal quality and the preliminary crystallographic analysis of recombinant canavalin from *Canavalia ensiformis*. *J. Cryst. Growth* 232:387-398.
- Hoover, R.B., Pikuta, E. V., Marsic, D. and **Ng, J.D.** (2001). Anaerobic Psychrophiles from Alaska, Antarctica, and Patagonia: Implications to Possible Life on Mars and Europa. *Proceedings to the International Society for Optical Engineering: Instruments, Methods and Missions for Astrobiology II* . 4495:313.
- Marsic, D., Hoover, R.B., Gilinchinsky, D.A. and **Ng, J.D.** (2000). Gene cloning of the 18S rRNA for ancient viable moss from the perma frost of northeastern Siberia. *Proceedings to the International Society for Optical Engineering: Instruments, Methods and Missions for Astrobiology II* . 3755:163-173.
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- Lorber, B., Sauter, C., **Ng, J.D.**, Zhu, D.W., Giege, R., Vidal, O., Robert, M.C. and Capelle. (1999). Characterization of protein and virus crystals by quasi-planar wave X-ray topography: a comparison between crystals grown in solution and in agarose. *J. Cryst. Growth* 204:357-368.
- Sauter, C., **Ng, J.**, Lorber, B., Keith, G., Brion, P., Hosseini, M.W., Lehn, J-M and Giegé, R. (1999). Additives for the crystallization of proteins and nucleic acids. *J. Cryst. Growth* 196:365-376.
- **Ng, J.D.**, Lorber, B., Giegé, R., Koszelak, S., Day, J., Greenwood, A. and McPherson, A. (1997) Comparative analysis of thaumatin crystal grown on earth and in microgravity. *Acta Crystallogra. D*53, 724-733.
- **Ng, J.D.**, Kuznetsov, Y.G., Malkin, A.J., Keith, G., Giegé, R. and McPherson, A. (1997). Visualization of nucleic acid crystal growth by atomic force microscopy. *Nucleic Acid Research* 25 :2582-2588.
- Koszelak, S., **Ng, J.D.**, Day, J., Ko, T.-P. and McPherson, A. (1997). The crystallographic structure of the protease from *Penicillium cyclopium*. *Biochemistry* 36 : 6597-6604.
- **Ng, J.D.**, Lorber, B., Witz, J., Dietrich-Théobald, A., Kern, D. and Giegé, R. (1996). Crystal growth of macromolecules from precipitation. *J. Crystal Growth* 168:50-62.
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- **Ng, J.D.**, Ko, T.-P. and McPherson A. (1993). Cloning, expression and crystallization of jack bean (*Canavalia ensiformis*) canavalin. *Plant Physiol.* 101:713-738
- Ko, T.-P., **Ng, J.D.** and McPherson, A. (1993). The three dimensional structure of canavalin from jack bean (*Canavalia ensiformis*). *Plant Physiol.* 101:729-744.
- **Ng, J.D.**, Stinchcombe, T.J., Alexander, E and McPherson, A. (1992). The PCR cDNA of Canavalin. *Rice Biotechnology Quarterly* 11:33.
- **Ng, J.D.**, Stinchcombe, T.J., Alexander, E. and McPherson, A. (1992). The PCR cDNA sequence of canavalin reserve protein from *Canavalia ensiformis*. *J. Plant Mol. Biol.* 18:147-149.
- Koszelak, S., Martin, D., **Ng, J.D.** and McPherson, A. (1991). Time lapse microphotography of protein crystal growth. *J.Crystal Growth* 110:117-181.
- **Ng, J.D.** and McPherson, A. (1989). Preliminary crystallographic analysis of proteolytically modified form of E.coli Single Stranded DNA Binding Protein. *J. Biomolec. Struct. & Dynam.* 6:1071-1076.
- Kim, M.H., Nakayama, R., Manos, P., Tomlinson, J.E., Cho, E., **Ng, J.D.** and Holten, K. (1989). Regulation of Apolipoprotein E synthesis and mRNA by diet and hormones. *J. Lipids Res.* 30:663-671.
- McPherson, A., Strongin, K., Gibbs, **Ng, J.D.**, Day, J. and Green, M. (1989). The structure of the Vicilin Storage Proteins of Legumes. *J. Cell Biol.* 107:41.

Complete list of published work in MyBibliography:

https://www.ncbi.nlm.nih.gov/myncbi/1TSF_2nel55kf/bibliography/public/

Patents

- **Ng, J.D.**, Gavira, J.A., García-Ruiz, J.M., Wells, M., Jenkins, G. Crystallization cassette for the growth and analysis of macromolecular crystals and an associated method. Patent no. **US 7,118,626 B2** Oct 10, 2006.
- Pusey, M.L., Dowell, J., **Ng, J.D.** and Chittur, K. (2007) Nucleic Acid Detector and Method of Detecting Targets within a Sample. Patent no. **US 7,291,459** Nov 11, 2007.

Teaching (*while at University of Alabama in Huntsville*)

Didactic classes (sole instructor)

BYS 219 Genetics and Evolution

BYS 361 General Biochemistry I

BYS 362 General Biochemistry I Lab

BYS 363 General Biochemistry II

BYS 365 General Biochemistry II Lab

BYS 519 Gene Structure and Function (Advanced Structural and Molecular Biology)

BYS 543 Molecular Biology of the Cell (Senior & Graduate Level)

BYS 547 Graduate Biochemistry I

BYS 548 Graduate Biochemistry II

BYS 690 Graduate Seminar

BYS 691 Introduction to Synthetic Biology (Special Topics)

BYS 691 Macromolecular Crystallization and X-ray Crystallography (Special Topics)

BYS 691 Recombinant cloning and protein purification (Special Topics)

BYS 691/601/602 Introduction to Bioinformatics/Biological computation

Non-Didactic classes (specialized instructions-sole instructor)

RNA isolation and analysis

Neutron Diffraction

Thermophilic proteins

Macromolecular crystallization

X-ray crystallography

Graduate students and postgraduate fellows mentored (**Only those that have finished are listed**)

Individuals are named followed by the years in the lab and where they were employed immediately after leaving.

Undergraduate students are not listed.

- Noriko Inoguchi (Postdoc 2016-2022). iXpressGenes Inc. Huntsville, AL, US.
- Jake Brouwer (M.S. 2017-2019). Paragon Research, Huntsville, AL, US.
- Manavalan Gajapathy (Ph.D. 2012 -2017). Hudson Alpha Institute of Biotechnology, AL, US.
- James Wolfsberger (M.S. 2013-2015). UAH Doctoral Biotech Program.
- Jayson Pagan (M.S. 2013-2015). Nectar, Huntsville, AL, US.
- Talitha Holmes (Ph.D. 2007-2013). Research Analyst, Huntsville.
- Anuj Singhal (M.S. 2011-2012). iXpressGenes Inc., Huntsville, AL, US.
- Domenico De Bernardo (M.S. 2010-2012). UAH Doctoral Biotech Program.
- Ronny C. Hughes (Ph.D. 2006-2011). Hudson Alpha Institute of Biotechnology, AL, US.
- Miranda Byrne (Ph.D. 2004-2009), Hudson Alpha Institute of Biotechnology, AL, US.
- Qunying Yuan (Postdoc 2007-2008), iXpressGenes Inc., Huntsville, AL, US.
- José A. Gavira (Postdoc 2000-2003) Laboratorio Estadios Cristálograficos, Granda, Spain.
- Elena Pikuta (Postdoc 1999-2001), NSSTC, NASA, Huntsville, AL, US.
- Damien Marsic (Ph.D. 1999-2006), Florida State University, FL, US.
- Divya Pradhan (Ph.D. 2003-2007), Calhoun Community College, Huntsville, AL, US.
- Eva Bernhardsdotter (Ph.D. 2003-2005), Swedish Space Corporation, Stockholm, Sweden.
- Tishawn McWilliams (M.S. 2001-2003), Vintage Pharmaceuticals, Huntsville, AL, US.
- Ashely Creekmore (M.S. 2002-2004), deciBel Research, Inc. Huntsville, AL, US.

Synergistic Activities (*selected*)

- Chair of the *U.S. National Committee for Crystallography, The National Academies* (2014-2017).
- Principal organizer and host of *Frontiers in Structural Biology of Membrane Protein and Pittsburg Diffraction Conference*. Huntsville, AL (2015).
- Primary organizer and host of the 14th International Conference on the Crystallization of Biological Macromolecules (2012).
- Past President and current board member of the *Pittsburgh Diffraction Society* (2011-present).
- Instructor for the *Protein Crystallography and its Applications to Biomedical Sciences*, Universidad Nacional Autonoma de Mexico (UNAM), Mexico City (2012).
- Instructor for the *Federation of European Biochemical Societies (FEBS) workshop on the Advanced Methods in Macromolecular Crystallization*, Nove Hrad, Czech Republic (2012).
- Organizing member of the 11th and 12th International Conference on the Crystallization of Biological Macromolecules (August 2006), Montreal, Canada and Cancun, Mexico (May 2008) respectively.
- Assigned Co-editor for the *Proceedings to 10th and 12th International Conference on the Crystallization of Biological Macromolecules* to be published in *Acta Crystallographica Section D*. (May 2004, Aug 2008).
- Instructor for *Crystallization of Biological Macromolecules Workshop*, Uppsala University, Sweden (Summer 2003).

Selected Honors, awards, and other Forms of Special Recognition

- 2016 Innovation Award-Biology & Medicine. Protein Crystal Growth Development. International Space Station R&D Conference 2016.
- 2015 Featured as top 101 Rocket City Inventions, U.S. Space & Rocket Center/Smithsonian Institution. (Patent no. US 7,118,626 B2).
- 2014 UAH Outstanding Faculty Award.
- 2013 College of Business Administration Entrepreneurs Round Table.
- 2011 Martin Luther King, Jr. Award.
- 2008 Honor Society of Phi Kappa Phi.
- 2002 Foundation Award for Research and Creative Achievement.
- 2002 Dean's Service Award, College of Science, University of Alabama in Huntsville.
- 2001 Sigma Xi Scientific Research Society, UAH Researcher of the Year.
- 1995 French National Centre for Space Studies fellowship.
- 1993 French National Organization of Bioindustries (ORGANIBIO) fellowship.
- 1998 Walton B. Sinclair Outstanding Teaching Assistant Award.

Professional organizations and scholarly societies

Phi Kappa Phi

Sigma Xi Scientific Research Society

American Crystallographic Association

Alpha Chi Sigma National Chemistry Fraternity

International Union of Crystallography

Foreign languages: French, Cantonese, Spanish (in the order of competency)

Extracurricular activities: Music, Running