

CURRICULUM VITAE

Wah Chiu, Ph.D.
Professor

Department of Bioengineering, School of Engineering/Medicine
Department of Microbiology and Immunology, School of Medicine
Photon Science, SLAC National Accelerator Laboratory

James H. Clark Center
MC5447
318 Campus Drive
Stanford University
Stanford, CA 94305-5447

wahc@stanford.edu

Education

1969	B.A. in Physics, University of California, Berkeley
1973	Research Visitor, High-Voltage Electron Microscope Group, Cavendish Laboratory, Cambridge University, Cambridge, United Kingdom
1975	Ph.D. in Biophysics, University of California, Berkeley

Thesis and Postdoctoral Advisor

Robert M. Glaeser, University of California, Berkeley

Current Positions

2017 - present	Professor, Stanford University
2017 - present	Scientific Director, SLAC Stanford Cryo-EM Facilities
2017 - present	Adjunct Professor, Baylor College of Medicine
1988 - present	Founding Director, National Center for Macromolecular Imaging

Previous Positions

1975 - 1977	Postdoctoral Research Associate, University of California, Berkeley, California
1977 - 1979	Biophysicist, Lawrence Berkeley Laboratory, University of California, Berkeley, California
1979 - 1983	Assistant Professor, Department of Cellular and Developmental Biology, University of Arizona, Tucson, Arizona
1983 - 1988	Associate Professor, Department of Biochemistry and Department of Molecular and Cellular Biology, University of Arizona, Tucson, Arizona
1986 - 1987	Visiting Professor, MRC Laboratory of Molecular Biology, Cambridge, United Kingdom
1990 - 2016	Founding Co-Director, W. M. Keck Center for Computational Biology, Baylor College of Medicine and Rice University, (University of Houston, University

1993 - 2016	of Texas Houston Medical School, MD Anderson Cancer Center, and University of Texas Galveston Medical Branch subsequently joined) Founding Director, Graduate Program in Structural and Computational Biology and Molecular Biophysics, Baylor College of Medicine
1996 - 1997	Visiting Professor, Max-Planck-Institut für Biochemie, Martinsried, Germany
1999	Visiting Professor, Department of Biophysics, Kyoto University, Kyoto, Japan
2011 - 2012	Visiting Professor, King Saud University, Riyadh, Saudi Arabia
2008 - 2015	Visiting Professor, Department of Biological Sciences, National University of Singapore, Singapore
2001 - 2015	Adjunct Professor, University of Texas School of Biomedical Informatics
2005 - 2016	Founding Director, Center for Protein Folding Machinery: Baylor College of Medicine, Stanford University, University of California San Francisco, University of California San Diego, University of California Irvine, Massachusetts Institute of Technology, M.D. Anderson Cancer Center and Lawrence Berkeley National Laboratory
1988 - 2017	Professor, Departments of Biochemistry and Molecular Biology, Molecular Virology and Microbiology, and Molecular and Cell Biology, Baylor College of Medicine, Houston, Texas
1991 - 2017	Professor, Department of Molecular Physiology and Biophysics, Baylor College of Medicine, Houston, Texas
1996 - 2017	Alvin Romansky Chair Professor of Biochemistry, Baylor College of Medicine
2002 - 2017	Adjunct Professor of Physics, University of Houston
2004 - 2017	Adjunct Professor of Computer Science, Rice University
2010 - 2017	Distinguished Service Professor, Baylor College of Medicine

Honors

1972	Award of Merit, Oakland City Council
1974	Presidential Scholar of Electron Microscopy Society of America
1986	Guggenheim Fellow
1986	Visiting Fellow, Clare Hall, Cambridge University, Cambridge
1996	Alexander von Humboldt Research Prize
1999	Research Fellow, Japan Society for the Promotion of Science
2003	Chinese Biophysicists Network Award
2006	Presidential Award, American Academy of Nanomedicine
2007	Profiles in Excellence, Alliance for NanoHealth
2008	Elected Academician, Academia Sinica, Taiwan
2010	Distinguished Service Professorship, Baylor College of Medicine
2011	Achievement Award, Society of Chinese Bioscientists in America Houston Chapter
2012	Elected Member, United States National Academy of Sciences
2013	Elected Member, The Academy of Medicine, Engineering, and Science of Texas
2013	Distinguished Faculty Award, Baylor College of Medicine Alumni Association
2014	Honorary Doctorate of Philosophy, University of Helsinki, Finland
2014	Distinguished Scientist Award for the Biological Sciences, Microscopy Society of America

2015 Barbara and Corbin J. Robertson Jr. Presidential Award for Excellence in Education, Baylor College of Medicine

Professional Experience (partial)

2005 - Present Member, Scientific Advisory Board, RCSB Protein Data Bank
2006 - 2009 Chair, Gulf Coast Consortia for Collaborative Research with faculty membership from Baylor College of Medicine, Rice University, University of Houston, University of Texas Houston Medical School, M.D. Anderson Cancer Center, and University of Texas Galveston Medical Branch
2007 Member, Strategic Planning Committee, National Center for Research Resources, National Institutes of Health
2007 - 2008 Member, Advisory Board, National Research Program for Genomics Medicine, Academia Sinica, Taiwan
2007 - 2012 Member, Advisory Board, HIV Structural Biology Program, National Institute of General Medical Sciences, National Institutes of Health
2007 - 2015 Member and Chair (2012-2015), Expert Panel for Biomedical Engineering & Life Sciences Cluster, Singapore Ministry of Education
2007 - Present Member, Panel for SystemsX, Research Council of the Swiss National Science Foundation
2010 Member, Advisory Board, Nanotechnology Program, National Institute of Biomedical Imaging and Bioengineering, National Institutes of Health
2010 - 2013 Member, Advisory Board, Structural Genomics Program, National Institute of General Medical Sciences, National Institutes of Health
2010 - Present Member, Advisory Board, Integrated Structural Biology Infrastructure for Europe (INSTRUCT)
2010 - Present Member, Advisory Committee, world-wide Protein Data Bank (wwPDB)
2010 - 2015 Member, Board of Scientific Counselors, National Institute of Biomedical Imaging and Bioengineering, National Institutes of Health
2011 - 2013 Reviewer, European Research Council Executive Agency (ERCEA), Brussels
2011- Present Member, Scientific Advisory Board, Institute of Biological Chemistry Institute, Academia Sinica, Taiwan
2012 - 2017 Member, Scientific Advisory Board, Michael E. DeBakey VA Medical Center, Houston
2013 - 2014 Member, NIGMS Committee on Protein Science Initiative Transition Strategy
2013 - 2017 Member, Scientific Advisory Board, Max Planck Institute of Biochemistry in Martinsried, Germany
2014 - Present Member, Scientific Advisory Board, BioXFEL Center, University of Buffalo.
2015 - Present Member, Scientific Advisory Board, Division of Structural Biology, St. Jude Children's Research Hospital
2016 - Present Member, Scientific Advisory Board, Biozentrum, Universität Basel, Basel, Switzerland
2016 Ad Hoc Member, Board of Scientific Counselors, National Institute of Allergy and Infectious Diseases, National Institutes of Health

Current Editorships

1997 - Present Member, Editorial Board, *Journal of Microscopy and Microanalysis*

2000 - Present	Member, Editorial Board, <i>Journal of Microscopy</i>
2004 - Present	Member, Editorial Board, <i>Structure</i>
2006 - Present	Member, Editorial Board, <i>Journal of Structural and Functional Genomics</i>
2008 - Present	Member, Editorial Board, <i>Quarterly Reviews of Biophysics</i>
2011 - Present	Member, Editorial Board, <i>Journal of Nanobiotechnology</i>
2013 - Present	Member, Editorial Board, <i>Progress in Biophysics & Molecular Biology</i>
2015 - Present	Member, <i>Quarterly Reviews of Biophysics Discovery</i>

Conferences/Symposia/Workshops Organized (Partial List)

2005	Session Chair, NIGMS Symposium on Structural Analysis of Large Macromolecular Assemblies: Sizing Up the Challenge, Bethesda
2005	Chair, Annual NCCR Principal Investigators Conference, Bethesda
2005	Session Chair, Hybrid Methods, XX Congress of the International Union of Crystallography, Florence, Italy
2006	Session Chair, International Summer School in Crystallography, Sicily, Italy
2006	Chair, Cryo-EM Workshop, Houston, Texas
2006	Session Chair, 3-D EM Gordon Conference, Italy
2006	Session Chair, American Chemical Society Conference, Houston
2007	Chair, Symposium on Structural Biology in Cancer Research, Houston
2007	Chair, Symposium on Nanomedicine, Biophysical Society, Baltimore
2007	Co-chair, Single Particle Image Processing Workshop, Houston
2007	Chair, Grand Challenges in Nanomedicine Workshop, Houston
2008	Chair, Translational Nanomedicine Workshop, Houston
2008	Chair, Cryo-EM workshop, Sun Yat-sen University, Guangzhou, China
2008	Co-chair, Single Particle Image Processing Workshop, Houston
2009	Chair, Cryo-EM based modeling workshop, Houston
2009	Co-chair, Cryo-EM workshop, London
2009	Chair, Pacific Rim Bioimaging Symposium, Hong Kong
2010	Chair, Modeling cryo-EM Maps, Houston
2010	Co-chair, Animation Workshop, UCSF
2010	Chair, Nanomedicine Minisymposium, Biophysical Society Meeting, San Francisco
2010	Co-chair, 6 th International Symposium on Structural Biology and Functional Genomics, National Singapore University
2011	Co-chair, Model Validation Workshop, Annual Pacific Symposium on Biocomputing, Hawaii
2011	Co-chair, Single Particle Image Processing Workshop, NCMI, Houston
2011	Chair, Gulf Coast Consortia Annual Retreat
2012	Co-Chair, Structural Biology, Keystone Symposium, Keystone
2012	Co-organizer, 5 th KH Kuo International Symposium on Structural Biology, China
2012	Chair, Cryo-Electron Microscopy Workshop, National University of Singapore, Singapore
2013	Chair, Cryo-Electron Microscopy Workshop, National Cheng Kung University, Taiwan
2013	Co-Chair, 4 th Xiamen Structural Biology Annual Symposium, Xiamen, China
2014	Chair, First Cold Spring Harbor Symposium on Structural Biology, Suzhou, China

2015	Co-Chair, Image Processing Workshop and CryoEM Symposium, Houston, TX
2015	Chair, Symposium on How Can Understanding Protein Structure Help us Unravel the Mysteries of Neurodegenerative Disease? Neuroscience Annual Conference, Chicago, IL.
2016	Chair, Nanomedicine Symposium, MD Anderson Cancer Center, Houston, TX
2016	Chair, CryoEM Symposium, American Chemical Society, Galveston, TX
2017	Member, Advisory Board, Nobel Symposium on Protein Folding, Sweden
2018	Co-Chair, Cryo-EM Symposium American Crystallography Association, Toronto, Canada

Professional Societies/Committees (Partial)

1984 - 1985	Elected President, Arizona Society of Electron Microscopy and Microbeam Analysis
1986 - 1988	Chairman, Task Force Committee on Cryo-microscopy Technology, Electron Microscopy Society of America
1989 - 1997	Member, Education Committee, Biophysical Society
1991 - 1992	Elected President, Society of Chinese Bioscientists in America, Houston Chapter
1995 - 1999	International Committee, Microscopy Society of America
1996 - 1999	Elected Membership Committee, Society of Chinese Bioscientists in America
2006 - 2010	Member, Board of Directors, American Academy of Nanomedicine
2011 - 2015	Council Member, American Society of Nanomedicine
2012	Member, Selection Committee, National Academy of Sciences Alexander Hollaender Award in Biophysics
2014	Member, Selection Committee for Foreign Member in Biophysics Section, National Academy of Sciences
2015	National Academy of Sciences Council Designee for the Class II CMC
2015	Member, Selection Committee, National Academy of Sciences Alexander Hollaender Award in Biophysics
2018	Chair, Selection Committee, National Academy of Sciences Alexander Hollaender Award in Biophysics

Past and Current Memberships of Professional Societies

American Association for the Advancement of Science
 American Cell Biology Society
 American Crystallographic Association
 American Society for Virology
 Biophysical Society
 Microscopy Society of America
 Society of Chinese Bioscientists in America
 American Society of Microbiology
 American Society of Nanomedicine

Courses Taught

Freshman introductory course in Cellular and Molecular Biology

Senior-level course in Supramolecular Structure

Graduate courses in Biophysical Techniques; Advanced Topics in Electron Microscopy; Physical Biochemistry; Biomembranes; Experimental Virology; Macromolecular Design and Analysis; Molecular Biophysics; Structural Basis of Human Diseases; Advanced Molecular and Computational Biophysics; Structural Biology; Image Processing for Macromolecular Complexes; Computational Mathematics for Quantitative Biology

Publications (Papers)

- Chiu, W. and Glaeser, R.M. (1975). Single-atom image contrast: Conventional dark-field and bright-field electron microscopy. *J Microsc*, **103**:33-54. PMID1095752.
- Chiu, W. and Glaeser, R.M. (1977). Factors affecting high resolution fixed-beam transmission electron microscopy. *Ultramicroscopy*, **2**:207-217. PMID888240.
- Chiu, W. and Hosoda, J. (1978). Crystallization and preliminary electron diffraction study to 3.7 Å of DNA helix-destabilizing protein GP 32^{*}. *J Mol Biol*, **122**:103-107.
- Chiu, W. (1978). Factors in high-resolution biological structure analysis by conventional transmission electron microscopy. *Scanning Electron Microsc*, **1**:569-580.
- Glaeser, R.M., Chiu, W. and Grano, D. (1979). Structure of the surface layer protein of the outer membrane of *Spirillum serpens*. *J Ultrastruc Res*, **66**:235-242. PMID439191.
- Chiu, W. and Glaeser, R.M. (1980). Evaluation of photographic emulsion for low-exposure imaging. In *Electron Microscopy at Molecular Dimensions*, Eds. W. Baumeister and W. Vogell, Springer Verlag, Berlin, pp. 194-199.
- Chiu, W. and Jeng, T.W. (1980). Electron diffraction study of crotoxin complex at 1.6 Å. In *Electron Microscopy of Molecular Dimensions*, Eds. W. Baumeister and W. Vogell, Springer Verlag, Berlin, pp. 137-142.
- Downing, K.H. and Chiu, W. (1980). Effect of stray magnetic field on image resolution in transmission electron microscopy. *Ultramicroscopy*, **5**:351-356.
- Chiu, W., Knapek, E., Jeng, T.W. and Dietrick, I. (1981). Electron radiation damage of a thin protein crystal at 4 K. *Ultramicroscopy*, **6**:291-296.
- Cohen, H. and Chiu, W. (1981). Accumulated dose dependence of support film contrast transfer function. *Ultramicroscopy*, **6**:335-342.
- Chiu, W. (1982). High-resolution electron microscopy of unstained, hydrated protein crystals. In *Electron Microscopy of Proteins*, Vol. II, Ed. J. R. Harris, Academic Press, London, pp. 233-259.
- Chiu, W. and Jeng, T.W. (1982). Electron radiation sensitivity of protein crystals. *Ultramicroscopy*, **10**:63-70. PMID6753294.
- Chiu, W., Rankert, D., Cumming, M.A. and Robinson, J.P. (1982). Characterization of crystalline filtrate tetanus toxin. *J Ultrastruc Res*, **79**:285-293. PMID7086947.
- Kellenberger, E. and Chiu, W. (1982). Perspectives and outlook for electron microscopy in biology in general. *Ultramicroscopy*, **10**:165-177. PMID6182665.

- Jeng, T.W. and Chiu, W. (1983). Low-dose electron microscopy of crotoxin complex thin crystal. *J Mol Biol*, **164**:329-346. PMID6842594.
- Cohen, H.A., Chiu, W., and Hosoda, J. (1983). Structural analysis of T4 DNA helix destabilizing protein (gp32^{*}I) crystal. *J Mol Biol*, **169**:235-248. PMID6312050.
- Jeng, T.W. and Chiu, W. (1984). Experimental strategy in 3-dimensional structure determination of crotoxin complex thin crystal. *Ultramicroscopy*, **13**:27-34. PMID6474598.
- Cohen, H.A., Grant, R.A., Jeng, T.W., and Chiu, W. (1984). Specimen preparative methods for protein electron crystallography. *Ultramicroscopy*, **13**:19-26. PMID6540906.
- Jeng, T.W., Chiu, W., Zemlin, F., and Zeitler, E. (1984). Electron imaging of crotoxin complex crystal at 3.5 Å. *J Mol Biol*, **175**:93-97. PMID6726806.
- Cohen, H.A., Schmid, M.F., and Chiu, W. (1984). Estimates of validity in projection approximation for three-dimensional reconstructions at high resolution. *Ultramicroscopy*, **14**:219-226. PMID6506323.
- Jeng, T.W. and Chiu, W. (1984). Quantitative assessment of radiation damage in a protein crystal. *J Microsc*, **136**:35-44. PMID6512854.
- Grant, R.A., Schmid, M.F., Chiu, W., Deatherage, J., and Hosoda, J. (1986). Alignment and merging of electron microscopy images of frozen, hydrated crystals of the T4 DNA helix destabilizing protein gp32^{*}I. *Biophys J*, **49**:251-258. PMC1329629.
- Chiu, W. (1986). Electron microscopy of frozen, hydrated biological specimens. *Ann Rev Biophys Biophys Chem*, **15**:237-257. PMID3087377.
- Chiu, W., Downing, K.H., Dubochet, J., Glaeser, R.M., Heide, H.G., Knapek, E., Kopf, D.A., Lamvik, M.K., Lepault, J., Robertson, J.D., Zeitler, E., and Zemlin, F. (1986). Cryoprotection in electron microscopy. *J Microsc*, **141**:385-391.
- Chiu, W., Jeng, T.W., Degen, L.L., and Prasad, B.V.V. (1986). Potential for high-resolution electron crystallography at intermediate high voltage. *Ann N Y Acad Sci*, **483**:149-156. PMID3471122.
- Prasad, B.V.V. and Chiu, W. (1987). Sequence comparison of single-stranded DNA binding proteins and its structural implications. *J Mol Biol*, **193**:579-584. PMID3295261.
- Talmon, Y., Prasad, B.V.V., Clerx, J.P.M., Wang, G. J., Chiu, W., and Hewlett, M. (1987). Electron microscopy of vitrified-hydrated La Crosse virus. *J Virol*, **61**:2319-2321. PMID3586135.
- Jeng, T.W. and Chiu, W. (1987). High-resolution cryo-system designed for JEM 100 CX electron microscopy. *Ultramicroscopy*, **23**:61-66. PMID3660492.
- Prasad, B.V.V., Wang, G.J., Clerx, J.P.M., and Chiu, W. (1987). Cryoelectron microscopy of spherical viruses: An application to rotavirus. *Micron Microsc Acta*, **18**:327-331.
- Prasad, B.V.V., Wang, G.J., Clerx, J.P.M., and Chiu, W. (1988). Three-Dimensional structure of rotavirus. *J Mol Biol*, **199**:269-275. PMID2832610.
- Jeng, T.W., Talmon, Y., and Chiu, W. (1988). A containment system for the preparation of vitrified-hydrated virus specimens. *J Electron Microsc Tech*, **8**:343-348. PMID3199217.
- Robinson, J., Schmid, M.F., Morgan, D. and Chiu, W. (1988). Three-dimensional structural analysis of tetanus toxin by electron crystallography. *J Mol Biol*, **200**:367-375. PMID3373534.
- Schrag, J.D., Schmid, M.F., Morgan, D.G., Phillips Jr., G.N., Chiu, W., and Tang, L. (1988). Crystallization and preliminary X-ray diffraction analysis of 11S acetylcholinesterase. *J Biol Chem*, **263**:9795-9800. PMID3384821.

- Chang, C.-F., Rankert, D.A., Jeng, T.W., Morgan, D., Schmid, M.F., and Chiu, W. (1988). Cryoelectron microscopy of unstained, unfixed RecA-css DNA complexes. *J Ultrastruc Mol Struct Res*, **100**:166-172. PMID3066826.
- Frank, J., Chiu, W., and Degn, L. (1988). The characterization of structural variations within a crystal field. *Ultramicroscopy*, **26**:345-360. PMID3238812.
- Jeng, T.W., Crowther, R.A., Stubbs, G., and Chiu, W. (1989). Visualization of alpha helices in TMV by cryo-electron microscopy. *J Mol Biol*, **205**:251-257. PMID2926805.
- Schrag, J., Prasad, B.V.V., Rixon, J.F., and Chiu, W. (1989). Three-Dimensional structure of the HSV-1 nucleocapsid. *Cell*, **56**:651-660. PMID2537151.
- Chiu, W. (1989). Three-dimensional electron microscopy resource center. *EMSA Bull*, **19**:96-97.
- Prasad, B.V.V., Burns, J.W., Marietta, E., Estes, M.K., and Chiu, W. (1990). Localization of VP4 neutralization sites in rotavirus by three-dimensional cryo-electron microscopy. *Nature*, **343**:476-479. PMID2153941.
- Prasad, B.V.V., Degn, L.L., Jeng, T.-W., and Chiu, W. (1990). Estimation of allowable errors for tilt parameter determination in protein electron crystallography. *Ultramicroscopy*, **33**:281-285. PMID2260229.
- Downing, K.H. and Chiu, W. (1990). Cold-stage design for high-resolution electron microscopy of biological materials. *Electron Microsc Rev*, **3**:213-226. PMID2103342.
- Grant, R., Schmid, M.F., and Chiu, W. (1991). Analysis of symmetry and three-dimensional reconstruction of thin Gp32*1 crystals. *J Mol Biol*, **217**:551-562. PMID1847218.
- Brink, J. and Chiu, W. (1991). Contrast analysis of cryo-images of n-paraffin recorded at 400 kV out to 2.1 Å resolution. *J Microscopy*, **161**:279-295. PMID2038034.
- Hewlett, M.J. and Chiu, W. (1991). Virion Structure. *Curr Top Microbiol Immunol*, **169**:79-90.
- Wang, G.-J., Hewlett, M., and Chiu, W. (1991). Structural variation of La Crosse virions under different chemical and physical conditions. *Virology*, **184**:455-459. PMID1871980.
- Schmid, M.F., Matsudaira, P., Jeng, T.-W., Jakana, J., Towns-Andrews, Bordas, J., and Chiu, W. (1991). Crystallographic analysis of acrosomal bundle from *Limulus* sperm. *J Mol Biol*, **221**:711-725. PMID1920441.
- Rez, P., Chiu, W., Weiss, J., and Brink, J. (1992). The thickness determination of organic crystals under low-dose conditions using electron energy loss spectroscopy. *Microsc Res Tech*, **21**:166-170. PMID1558985.
- Schmid, M.F., Jakana, J., Matsudaira, P., and Chiu, W. (1992). Effects of radiation damage with 400-kV electrons on frozen, hydrated actin bundles. *J Struct Biol*, **108**:62-68. PMID1562434.
- Morgan, D.G., Grant, R.A., Chiu, W., and Frank, J. (1992). Patch averaging of electron images of gp32*1 crystals with variable thickness. *J Struct Biol*, **108**:245-256. PMID1335748.
- Brink, J., Chiu, W. and Dougherty, M. (1992). Computer-controlled spot-scan imaging of crotoxin complex crystals with 400-keV electrons at near atomic resolution. *Ultramicroscopy*, **46**:229-240. PMID1481273.
- Chiu, W. (1993). What does electron cryomicroscopy provide that X-ray crystallography and NMR spectroscopy cannot? *Annu Rev Biophys Biomol Struct*, **22**:233-255. PMID8347990.
- Schmid, M.F., Jakana, J., Matsudaira, P., and Chiu, W. (1993). Imaging frozen, hydrated acrosomal bundle from *Limulus* sperm at 7 Å Resolution with a 400-kV electron cryomicroscope. *J Mol Biol*, **230**:384-386. PMID8464053.

- Zhou, Z.H. and Chiu, W. (1993). Prospects for using an IVEM with an FEG for imaging macromolecules towards atomic resolution. *Ultramicroscopy*, **49**:407-416. PMID8475604.
- Avila-Sakar, A.J., Schmid, M.F., Li, L.-S., Whitby, F.G., Phillips Jr., G.N., and Chiu, W. (1993). Preliminary electron crystallographic analysis of ice-embedded tropomyosin crystals. *J Struct Biol*, **110**:67-74. PMID8494673.
- Frank, J., Chiu, W., and Henderson, R. (1993). Flopping polypeptide chains and Suleika's subtle imperfections: Analysis of variations in the electron micrograph of a purple membrane crystal. *Ultramicroscopy* **49**:387-396. PMID8475603.
- Prasad, B.V.V., Prevelige, P.E., Marietta, E., Chen, R.O., Thomas, D., King, J., and Chiu, W. (1993). Three-dimensional transformation of capsids associated with genome packaging in a bacterial virus. *J Mol Biol*, **231**:65-74. PMID8496966.
- Chiu, W., Schmid, M.F., and Prasad, B.V.V. (1993). Teaching electron diffraction and imaging of macromolecules. *Biophys J*, **64**:1610-1625. PMC1262489.
- Chiu, W. and Schmid, M.F. (1993). Electron crystallography of macromolecules. *Curr Opin Biotechnol*, **4**:397-402. PMID7763969.
- Paredes, A.M., Brown, D.T., Rothnagel, R., Chiu, W., Schoepp, R.J., Johnston, R.E., and Prasad, B.V.V. (1993). Three-dimensional structure of a membrane-containing virus. *Proc Natl Acad Sci USA*, **90**:9095-9099. PMC47508.
- Shaw, A.L., Rothnagel, R., Chen, D., Ramig, R.F., Chiu, W., and Prasad, B.V.V. (1993). Three-dimensional visualization of the rotavirus hemagglutinin structure. *Cell*, **74**:693-701. PMID8395350.
- Soejima, T., Sherman, M.B., Schmid, M.F., and Chiu, W. (1993). 4-Å projection map of bacteriophage T4 DNA helix-destabilizing protein (gp32*1) crystal by 400-kV electron cryomicroscopy. *J Struct Biol*, **111**:9-16. PMID8251266.
- Leapman, R., Brink, J. and Chiu, W. (1993). Low-dose thickness measurement of glucose-embedded crotoxin complex crystals by electron energy loss spectroscopy and STEM dark-field imaging. *Ultramicroscopy*, **52**:157-166. PMID8291165.
- Schmid, M.F., Agris, J. M., Jakana, J., Matsudaira, P., and Chiu, W. (1994). Three-dimensional structure of a single filament in the *Limulus* acrosomal bundle: Scruin binds to homologous helix-loop-beta motifs in actin. *J Cell Biol*, **124**:341-350. PMC2119938.
- Schmid, M.F., Prasad, B.V.V. and Chiu, W. (1994). Structural studies of viruses by electron cryomicroscopy. *Arch Virol Suppl*, **9**:523-529. PMID8032281.
- Chiu, W. and Smith, T.J. (1994). Structural studies of virus-antibody complexes by electron cryomicroscopy and x-ray crystallography. *Curr Opin Struct Biol*, **4**:219-224. PMID8546007.
- Prasad, B.V.V. and Chiu, W. (1994). Three-dimensional structure of rotavirus. *Curr Top Microbiol Immunol*, **185**:9-29.
- Avila-Sakar, A.J., Guan, T.-L., Arad, T., Schmid, M.F., Loke, T.W., Yonath, A., Piefke, J., Franceschi, F. and Chiu, W. (1994). Electron Cryomicroscopy of *B. stearothermophilus* 50S ribosomal subunits crystallized on phospholipid monolayers. *J Mol Biol*, **239**:689-697. PMID8014989.
- Sines, J., Rothnagel, R., van Heel, M., Gaubatz, J. W., Morrisett, J.D., and Chiu, W. (1994). Electron cryomicroscopy and digital image processing of lipoprotein(a). *Chem Phys Lipids*, **67/68**:81-89. PMID8187247.
- Brink, J. and Chiu, W. (1994). Applications of a slow-scan CCD camera in protein electron crystallography. *J Struct Biol*, **113**:23-34. PMID7880650.

- Zhou, Z.H., Prasad, B.V.V., Jakana, J., Rixon, F., and Chiu, W. (1994). Protein subunit structures in the herpes simplex virus capsid from 400 kV spot-scan electron cryomicroscopy. *J Mol Biol*, **242**:456-469. PMID7932703.
- Serysheva, I.I., Orlova, E.V., Chiu, W., Sherman, M.B., Hamilton, S.L., and van Heel, M. (1995). Electron cryomicroscopy and angular reconstitution used to visualize the skeletal muscle calcium release channel. *Nat Struct Biol*, **2**:18-24. PMID7719847.
- Lu, G., Zhou, Z.H., Jakana, J., Cai, D., Chen, S., Wei, X., Gu, X., and Chiu, W. (1995). Three-dimensional structure of rice dwarf virus by electron cryomicroscopy. *High Tech Lett*, **1**:1-4.
- Schmid, M.F., Jakana, J., Matsudaira, P., and Chiu, W. (1995). Three-dimensional structure of the acrosomal filament of *Limulus* sperm by 400-kV electron cryomicroscopy. *Biophys J*, **68**:8s-11s. PMC1281851.
- Thuman-Commike, P.A. and Chiu, W. (1995). Detection of virus particles in noisy spot-scan electron cryomicroscopy images. In: *Proc. IEEE 2nd Conf. Image Processing*, **3**:169-171.
- Chiu, W., Milligan, R., and Aebi, U. (1995). Editorial Comments. *J Struct Biol*, **115**:117-118.
- Schmid, M.F., Jakana, J., Chiu, W., and Matsudaira, P. (1995). A 7-Å projection map of frozen, hydrated acrosomal bundle from *Limulus* sperm. *J Struct Biol*, **115**:209-213. PMID7577241.
- Zhou, Z.H., He, J., Jakana, J., Tatman, J., Rixon, F., and Chiu, W. (1995). Assembly of VP26 in HSV-1 inferred from structures of wild-type and recombinant capsids. *Nat Struct Biol*, **2**:1026-1030. PMID7583656.
- Thuman-Commike, P.A. and Chiu, W. (1995). Automatic detection of spherical particles from spot-scan electron microscopy images. *J Microsc Soc Am*, **1**:191-201.
- Avila-Sakar, A.J. and Chiu, W. (1996). Visualization of beta sheets and side-chain clusters in 2-dimensional periodic arrays of streptavidin on phospholipid monolayers by electron crystallography. *Biophys J*, **70**:57-68. PMC1224909.
- Thuman-Commike, P.A. and Chiu, W. (1996). *PTOOL*: A software package for the selection of particles from electron cryomicroscopy spot-scan images. *J Struct Biol*, **116**:41-47. PMID8742721.
- Zhou, Z.H., Hardt, S., Wang, B., Sherman, M.B., Jakana, J., and Chiu, W. (1996). CTF determination of images of ice-embedded single particles using a graphics interface. *J Struct Biol*, **116**:216-222. PMID8742746.
- Chang, Z., Primm, T.P., Jakana, J., Lee, I.H., Serysheva, I., Chiu, W., Gilbert, H.F., and Quioco, F.A. (1996). *Mycobacterium tuberculosis* 16-kDa antigen (Hsp 16.3) functions as an oligomeric structure *in vitro* to suppress thermal aggregation. *J Biol Chem*, **271**:7218-7223. PMID8636160.
- Orlova, E.V., Serysheva, I.I., vanHeel, M., Hamilton, S.L., and Chiu, W. (1996). Two structural configurations of the skeletal muscle calcium release channel. *Nat Struct Biol*, **3**:547-552. PMID8646541.
- Thuman-Commike, P.A., Greene, B., Jakana, J., Prasad, B.V.V., King, J., Prevelige, P.E., and Chiu, W. (1996). Three-dimensional structure of scaffolding-containing phage P22 procapsids by electron cryo-microscopy. *J Mol Biol*, **260**:85-98. PMID8676394.
- Prasad, B.V.V., Rothnagel, R., Zeng, C.Q.-Y., Jakana, J., Lawton, J.A., Chiu, W., and Estes, M.K. (1996). Visualization of ordered genomic RNA and localization of the transcription enzymes in rotavirus. *Nature*, **382**:471-473. PMID8684490.
- Sherman, M.B., Brink, J., and Chiu, W. (1996). Performance of a slow-scan CCD camera for macromolecular imaging in a 400-kV electron cryomicroscope. *Micron*, **27**:129-139. PMID8858867.

- Chiu, W., Avila-Sakar, A.J., and Schmid, M.F. (1997). Electron crystallography of macromolecular periodic arrays on phospholipid monolayers. *Adv Biophys*, **34**:161-172. PMID9204133.
- King, J. and Chiu, W. (1997). The procapsid to capsid transition in double-stranded DNA bacteriophages. *In: Structural Biology of Viruses* eds. W. Chiu, R.M. Burnett and R. L. Garcea, Oxford Press, New York, pp. 288-311.
- Garcea, R.L., Burnett, R.M., and Chiu, W. (1997). Introduction. *In: Structural Biology of Viruses* eds. W. Chiu, R.M. Burnett and R. L. Garcea, Oxford Press, New York, pp. i-iii.
- Chiu, W., Nanopoulos, D., and Brinkley, W.R. (1997). Forward: Biophysics of Microtubules. *J Struct Biol*, **118**:83.
- Chiu, W. and Schmid, M.F. (1997). Pushing back the limits of electron cryomicroscopy. *Nature Struct Biol*, **4**:331-333. PMID9145097.
- Thuman-Commike, P.A. and Chiu, W. (1997). Improved common-line based icosahedral virus particle image orientation estimation algorithms. *Ultramicroscopy*, **68**:231-256. PMID9261080.
- Grimes, J.M., Jakana, J., Ghosh, M., Basak, A.K., Roy, P., Chiu, W., Stuart, D.I., and Prasad, B.V.V. (1997). An atomic model of the outer layer of the bluetongue virus core derived from X-ray crystallography and electron cryomicroscopy. *Structure*, **5**:885-893. PMID9261080.
- McGough, A., Pope, B., Chiu, W., and Weeds, A. (1997) Cofilin changes the twist of F-actin: implications for actin filament dynamics and cellular function. *J Cell Biol*, **138**:771-781. PMC2138052.
- Sherman, M.B. and Chiu, W. (1997). Reliability of phases retrieved from 400 kV spot-scan images of purple membranes acquired on a slow-scan CCD camera. *J Microsc*, **188**:285-289. PMID9450331.
- Sherman, M.B., Jakana, J., Sun, S., Matsudaira, P., Chiu, W., and Schmid, M.F. (1997). A strategy for electron tomographic data collection and crystallographic reconstruction of biological bundles. *J Struct Biol*, **120**:245-256. PMID9441930.
- Thuman-Commike, P.A., Greene, B., Malinski, J.A., King, J., and Chiu, W. (1998). Role of the scaffolding protein in P22 procapsid size determination suggested by T=4 and T=7 procapsid structures. *Biophys J*, **74**:559-568. PMC1299408.
- Zhou, Z.H., Chiu, W., Haskell, K., Spears, H.J., Jakana, J., Rixon, F.J., and Scott, L.R. (1998). Refinement of herpesvirus B-capsid structure on parallel supercomputers. *Biophys J*, **74**:576-588. PMC1299410.
- Paredes, A.M., Thuman-Commike, P., Heidner, H., Prasad, B.V.V., Johnston, R.E., and Chiu, W. (1998). Structural localization of the E3 glycoprotein in attenuated Sindbis virus mutants. *J Virology*, **72**:1534-1541. PMC124635.
- McGough, A., Chiu, W., and Way, M. (1998). Determination of the gelsolin binding site on F-actin: implications for severing and capping. *Biophys J*, **74**:764-772. PMC1302557.
- Zhou, Z.H., Macnab, S.J., Jakana, J., Scott, L.R., Chiu, W., and Rixon, F.J. (1998). Identification of the sites of interaction between the scaffold and outer shell in HSV-1 capsids by difference electron imaging. *Proc Natl Acad Sci USA*, **75**:2778-2783. PMC19645.
- Saad, A., Chiu, W., and Thuman-Commike, P. (1998). Multiresolution approach to automatic detection of spherical particles from electron microscopy images. *Proceedings of the IEEE 5th International Conference on Image Processing*. Chicago, IL, pp.W8-10.

- Brink, J., Sherman, M.B., Berriman, J., and Chiu, W. (1998). Evaluation of charging on macromolecules in electron cryomicroscopy. *Ultramicroscopy*, **72**:41-52. PMID9561756.
- Frey, W., Brink, J., Schief Jr., W.R., Chiu, W., and Vogel, V. (1998). Electron crystallographic analysis of two-dimensional streptavidin crystals coordinated to metal-chelated monolayers. *Biophys J* **74**:2674-2679. PMC1299607.
- Brink, J., Gross, H., Tittman, P., Sherman, M.B., and Chiu, W. (1998). Reduction of charging in protein electron cryomicroscopy. *J Microsc*, **191**:67-73. PMID9723190.
- Lu, G., Zhou, Z.H., Baker, M.L., Jakana, J., Cai, D., Wei, X, Chen, S., Gu, X., and Chiu, W. (1998). Structure of double-shelled rice dwarf virus. *J Virology*, **72**:8541-8549. PMC110264.
- Sherman, M.B., Soejima, T., Chiu, W., and van Heel, M. (1998). Multivariate analysis of single unit cells in electron crystallography. *Ultramicroscopy*, **74**:179-199. PMID9809457.
- Chiu, W., McGough, A., Sherman, M., and Schmid, M.F. (1999). High resolution electron cryomicroscopy of macromolecular assemblies. *Trends Cell Biol*, **9**:154-159. PMID10203794.
- Thuman-Commike, P.A., Tsuruta, H., Greene, B., Prevelige Jr., P.E., King, J., and Chiu, W. (1999). Solution x-ray scattering based estimation of electron cryomicroscopy imaging parameters for reconstruction of virus particles. *Biophys J*, **76**:2249-2261. PMC1300198.
- Zhou, Z.H., Chen, D.H., Jakana, J., Rixon, F.J., and Chiu, W. (1999). Visualization of tegument/capsid interactions and DNA in intact herpes simplex virus type 1 virions. *J Virology*, **73**:3210-3218. PMC104084.
- Saad, A., Zhou, Z. H., Jakana, J., Chiu, W., and Rixon, F. J. (1999). Roles of triplex and scaffolding proteins in herpes simplex virus type 1 capsid formation suggested by structures of recombinant particles. *J Virology*, **73**: 6821-6830. PMC112767.
- Orlova, E.V., Serysheva, I.I., Hamilton, S.L., Chiu, W., and van Heel, M. (1999). The skeletal muscle calcium release channel visualized by electron cryomicroscopy and angular reconstitution. In: *The structure and function of ryanodine receptors* eds. Sitsapesan R. and Williams, A. J., Imperial College Press, London, pp. 23-46.
- Thuman-Commike, P.A., Greene, B., Malinski, J.A., Burbea, M., McGough, A., Chiu, W., and Prevelige Jr., P.E. (1999). Mechanism of scaffolding-directed virus assembly suggested by comparison of scaffolding-containing and scaffolding-lacking P22 procapsids. *Biophys J*, **76**:3267-3277. PMC1300296.
- Saad, A., Zhou, Z.H., Jakana, J., Chiu, W., and Rixon, F.J. (1999). Roles of triplex and scaffolding proteins in HSV-1 capsid formation suggested by the structures of recombinant particles. *J Virology*, **73**:6821-6830. PMC112767.
- Orlova, E.V., Sherman, M.B., Chiu, W., Mowri, H., Smith, L.C., and Gotto Jr., A.M. (1999). Three-dimensional structure of low density lipoproteins by electron cryomicroscopy. *Proc Nat Acad Sci USA*, **96**:8420-8425. PMC17531.
- McGough, A. and Chiu, W. (1999). ADF/Cofilin weakens lateral contacts in the actin filament. *J Mol Biol*, **291**:513-519. PMID10448032.
- Serysheva, I.I., Schatz, M., van Heel, M., Chiu, W., and Hamilton, S.L. (1999). Structure of the skeletal muscle calcium release channel activated with Ca²⁺ and AMP-PCP. *Biophys J*, **77**:1936-1944. PMC1300475.
- Sherman, M.B., Jakana, J., Sun, S., Matsudaira, P., Chiu, W., and Schmid, M.F. (1999). The three-dimensional structure of the Limulus acrosomal process: A dynamic actin bundle. *J Mol Biol*, **294**:139-149. PMID10556034.

- Schmid, M.F., Sherman, M.B., Matsudaira, P., Tsuruta, H., and Chiu, W. (1999). Scaling structure factor amplitudes in electron cryomicroscopy using X-ray solution scattering. *J Struct Biol*, **128**: 51-57. PMID10600558.
- Ludtke, S.J., Baldwin, P.R., and Chiu, W. (1999). EMAN: Semi-automated software for high resolution single particle reconstructions. *J Struct Biol*, **128**: 82-97. PMID10600563.
- Nogales, E. and Chiu, W. (1999). Editorial. *J Struct Biol*, **128**: 1-2. PMID10600551
- Zhang, Z., Greene, B., Thuman-Commike, P.A., Jakana, J., Prevelige Jr., P. E., King, J., and Chiu, W. (2000). Visualization of the maturation transition in bacteriophage P22 by electron cryomicroscopy. *J Mol Biol*, **297**: 615-626. PMID10731416.
- Thuman-Commike, P. A., Greene, B., Jakana, J., McGough, A., Prevelige, P. E., and Chiu, W. (2000). Identification of additional coat/scaffolding interactions in a bacteriophage P22 mutant defective in maturation. *J Virology*, **74**: 3871-3873. PMC111895.
- Zhou, Z. H., Dougherty, M., Jakana, J., He, J., Rixon, F. J., and Chiu, W. (2000). Seeing the herpesvirus capsid at 8.5 Å. *Science*, **288**: 877-880. PMID10797014.
- Johnson, J. E. and Chiu, W. (2000). Structures of virus and virus-like particles. *Curr Opin Struct Biol*, **10**:229-235. PMID10753814.
- Thuman-Commike, P.A. and Chiu, W. (2000). Reconstruction principles of icosahedral virus structure determination using electron cryomicroscopy. *Micron*, **31**: 687-711. PMID10838029.
- Dunker, A.K., Lawson, J.D., Brown, C.J., Romero, P., Oh, J., Oldfield, C.J., Campen, A. M., Ratliff, C.M., Hipps, K.W., Ausio, J., Nissen, M.S., Reeves, R., Kang, C., Kissinger, C.R., Bailey, R.W., Griswold, M.D., Chiu, W., Garner, E.C., and Obradovic, Z. (2001). Intrinsically disordered protein. *J Mol Graph Model*, **19**: 1-34. PMID11381529.
- Jiang, W., Baker, M. L., Ludtke, S. J., and Chiu, W. (2001). Bridging the information gap: Computational tools for intermediate resolution structure interpretation. *J Mol Biol*, **308**:1033-1044. PMID11352589.
- He, J., Schmid, M. F., Zhou, Z. H., Rixon, F., and Chiu, W. (2001). Finding and using local symmetry in identifying lower domain movements in hexon subunits of the herpes simplex virus type 1 B capsid. *J Mol Biol*, **309**:903-914. PMID11399067.
- Saad, A., Ludtke, S. J., Jakana, J., Rixon, F. J., Tsuruta, H., and Chiu, W. (2001). Fourier amplitude decay of electron cryomicroscopic images of single particles and effects on structure determination. *J Struct Biol*, **133**: 32-42. PMID11356062.
- Chiu, W. (2001). Electron diffraction of protein crystals. In: *IUCr Tables for Crystallography, Crystallography of Biological Macromolecules* eds. M. G. Rossmann and E. Arnold, Vol. **F**, Dordrecht: Kluwer Academic Publishers, The Netherlands, pp 423-427.
- Jiang, W. and Chiu, W. (2001). Web-based simulation for contrast transfer function and envelope functions. *Microsc Microanal*, **7**:329-334. PMID12597807.
- Ludtke, S. J. and Chiu, W. (2001). Electron micrographs: computer enhancement and use for molecular 3-dimensional reconstruction. In: *Encyclopedia of Life Sciences*, vol. 6, pp. 212-217. London: Nature Publishing Group. <http://www.els.net/>
- Ludtke, S. J. and Chiu, W. (2001). Editorial comments on special issue on single particle analysis. *J Struct Biol*, **133**: 89.
- Zhou, Z. H., Baker, M. L., Jiang, W., Dougherty, M., Jakana, J., Dong, G., Lu, G., and Chiu, W. (2001). Electron cryomicroscopy and bioinformatics suggest protein fold models for rice dwarf virus. *Nature Struct Biol*, **8**: 868-873. PMID11573092.

- Paredes, A., Alwell-Warda, K., Weaver, S. C., Chiu, W., and Watowich, S. J. (2001). Venezuelan equine encephalomyelitis virus structure and its divergence from old world alphaviruses. *J Virology*, **75**: 9532-9537. PMC114521.
- Ludtke, S.J., Jakana, J., Song, J.L., Chuang, D., and Chiu, W. (2001). A 11.5 Å single particle reconstruction of GroEL using EMAN. *J Mol Biol*, **314**: 253-262. PMID11718559.
- Chen, D. H., Jakana, J., McNab, D., Mitchell, J., Zhou, Z. H., Dougherty, M., Chiu, W., and Rixon, F. J. (2001). The pattern of tegument-capsid interaction in the herpes simplex virus type 1 virion is not influenced by the small hexon protein VP26. *J Virology*, **75**: 11863-11867. PMC114772.
- Jiang, W., Li, Z., Zhang, Z., Booth, C.R., Baker, M.L., and Chiu, W. (2001). Semi-automated icosahedral particle reconstruction at sub-nanometer resolution. *J Struct Biol*, **136**: 214-225. PMID12051901.
- Brink, J., Ludtke, S. J., Yang, C. Y., Gu, Z. W., Wakil, S. J., and Chiu, W. (2002). Quaternary structure of human fatty acid synthase by electron cryomicroscopy. *Proc Natl Acad Sci USA*, **99**: 138-143. PMC117528.
- Chiu, W., Baker, M.L., Jiang, W., and Zhou, Z.H. (2002). Deriving folds of macromolecular complexes through electron cryomicroscopy and bioinformatics approaches. *Curr Opin Struct Biol*, **12**: 263-269. PMID11959506.
- Chiu, W. and Rixon, F.J. (2002). High resolution structural studies of complex icosahedral viruses: a brief overview. *Virus Res*, **82**: 9-17. PMID11885957.
- Rockel, B., Jakana, J., Chiu, W., and Baumeister, W. (2002). Electron Cryo-microscopy of VAT, the Archaeal p97/CDC48 Homologue from *Thermoplasma acidophilum*. *J Mol Biol*, **317**: 673-681. PMID11955016.
- Yotnda, P., Chen, D.H., Chiu, W., Piedra, P.A., Davis, A., Templeton, N.S., and Brenner, M.K. (2002). Bilamellar cationic liposomes protect adenovectors from preexisting humoral immune responses. *Mol Ther*, **5**: 233-241. PMID11863412.
- Serysheva, I.I., Ludtke, S. J., Baker, M. R., Chiu, W., and Hamilton, S. L. (2002). Structure of the voltage-gated L-type Ca^{2+} channel by electron cryomicroscopy. *Proc Natl Acad Sci USA*, **99**: 10370-10375. PMC124921.
- Baker, M. L., Serysheva, I. I., Sencer, S., Wu, Y., Ludtke, S. J., Jiang, W., Hamilton, S. L., and Chiu, W. (2002). The skeletal muscle Ca^{2+} release channel has an oxidoreductase-like domain. *Proc Natl Acad Sci USA*, **99**: 12155-12160. PMC129414.
- Paredes, A., Alwell-Warda, K., Weaver, S.C., Chiu, W., and Watowich, S.J. (2003). Structure of isolated nucleocapsids from venezuelan equine encephalitis virus and implications for assembly and disassembly of enveloped virus. *J Virol*, **77**: 659-664. PMC140571.
- Bowman, B. R., Baker, M. L., Rixon, F. J., Chiu, W., and Quijcho, F. A. (2003). Structure of the herpesvirus major capsid protein. *EMBO J*, **22**: 757-765. PMC145446.
- Jiang, W., Li, Z., Zhang, Z., Baker, M.L., Prevelige, P.E., and Chiu, W. (2003). Coat protein fold and maturation transition of bacteriophage P22 seen at sub-nanometer resolutions. *Nat Struct Biol*, **10**: 131-135. PMID12536205.
- Rixon, F. and Chiu, W. (2003) Studying large viruses. *Adv Protein Chem*, **64**:413-444.
- Zhou, Z.H. and Chiu, W. (2003). Structural determination of icosahedral viruses by electron cryomicroscopy at sub-nanometer resolution. *Adv Protein Chem*, **64**: 93-130. PMID12051901.
- Ko, Y.H., Delannoy, M., Hüllihen, J., Chiu, W., and Pedersen, P.L. (2003). Mitochondrial ATP synthasome. Cristae-enriched membranes and a multiwell detergent screening assay yield

- dispersed single complexes containing the ATP synthase and carriers for Pi and ADP/ATP. *J Biol Chem*, **278**: 12305-12309. PMID12560333.
- Serysheva, I.I, Bare, D.J., Ludtke, S.J., Kettlun, C.S., Chiu, W., and Mignery, G.A. (2003). Structure of the type 1 Inositol 1,4,5-trisphosphate receptor revealed by electron cryomicroscopy. *J Biol Chem*, **278**: 21319-21322. PMID12714606.
- Baker, M. L., Jiang, W., Bowman, B. R., Zhou, Z. H., Quioco, F. A., Rixon, F. J., and Chiu, W. (2003). Architecture of the herpes simplex virus major capsid protein derived from structural bioinformatics. *J Mol Biol*, **331**: 447-456. PMID12888351.
- Ju, T., Warren, J., Eichele, G., Thaller, C., Chiu, W., and Carson, J. (2003). A geometric database for gene expression data. *Symp Geom Process*, pp.166-176. PMC2903551.
- Lee, S., Sowa, M.E., Watanabe, Y., Sigler, P.B., Chiu, W., Yoshida, M., and Tsai, F.T. (2003). The structure of ClpB, a molecular chaperone that rescues proteins from an aggregated state. *Cell*, **115**: 229-40. PMID14567920.
- Sherman, M. B. and Chiu, W. (2003). Electron beam coater for reduction of charging in ice-embedded biological specimens using Ti88Si12 alloy. *Microscopy and Microanalysis*, **9**: 566-573. PMID14750991.
- Ludtke, S. J., Nason, L., Tu, H., Peng, L., and Chiu, W. (2003). Object oriented database and electronic notebook for transmission electron microscopy. *Microscopy and Microanalysis*, **9**: 556-565. PMID14750990.
- Ludtke, S.J. and Chiu, W. (2003). Focal pair merging for contrast enhancement of single particles. *J Struct Biol*, **144**: 73-78. PMID1463210.
- Jiang, W., Baker, M.L., Wu, Q., Bajaj, A. and Chiu, W. (2003). Applications of a bilateral denoising filter in biological electron microscopy. *J Struct Biol*, **144**: 114-122.
- Sherman, M.B., Orlova, E.V., Decker, G.L., Chiu, W., and Pownall, H.J. (2003). Structure of triglyceride-rich human low-density lipoproteins according to cryoelectron microscopy. *Biochemistry*, **42**: 14988-93. PMID14674775.
- Brink, J., Ludtke, S.J., Kong, Y., Wakil, S., Ma, J., and Chiu, W. (2004). Experimental verification of conformational variation of human fatty acid synthase as predicted by normal mode analysis. *Structure*, **12**: 185-91. PMID14962379.
- Booth, C. R., Jiang, W., Baker, M. L., Hong Zhou, Z., Ludtke, S. J., and Chiu, W. (2004). A 9Å single particle reconstruction from CCD captured images on a 200kV electron cryomicroscope. *J Struct Biol*, **147**: 116-127. PMID15193640.
- Ludtke, S. J., Chen, D. H., Song, J. L., Chuang, D. T., and Chiu, W. (2004). Seeing GroEL at 6Å resolution by single particle electron cryomicroscopy. *Structure*, **12**: 1129-1136. PMID15242589.
- Paredes, A. M., Ferreira, D., Horton, M., Saad, A., Tsuruta, H., Johnston, R., Klimstra, W., Ryman, K., Hernandez, R., Chiu, W., and Brown, D. T. (2004). Conformational changes in Sindbis virions resulting from exposure to low pH and interactions with cells suggest that cell penetration may occur at the cell surface in the absence of membrane fusion. *Virology*, **324**: 373-386. PMID15207623.
- Mao, Y., Vyas, N.K., Vyas, M.N., Chen, D.H., Ludtke, S.J., Chiu, W., and Quioco, F.A. (2004). Structure of the bifunctional and Golgi-associated formiminotransferase cyclodeaminase octamer. *EMBO J*, **23**: 2963-71. PMC514939.
- Schmid, M.F., Sherman, M., Matsudaira, P., and Chiu, W. (2004). Structure of the acrosomal bundle. *Nature*, **431**: 104-107. PMID15343340.

- Chen, C., Ko, Y., Delannoy, M., Ludtke, S.J., Chiu, W., and Pedersen, P.L. (2004). Mitochondrial ATP synthasome: three-dimensional structure by electron microscopy of the ATP synthase in complex formation with carriers for Pi and ADP/ATP. *J Biol Chem*, **279**: 31761-8. PMID15166242.
- Bello, M., Ju, T., Warren, J., Carson, J., Chiu, W., Thaller, C., Eichele, G., and Kakadiaris, I. (2005). Hybrid segmentation framework for tissue images containing gene expression data. *Proc MICCAI*, **8**(Pt 1):254-61. PMID16685853.
- Serysheva, I.I., Hamilton, S. L., Chiu, W., and Ludtke, S. J. (2005). Structure of Ca²⁺ release channel at 14 Å resolution. *J Mol Biol*, **345**: 427-431. PMC2978512.
- Topf, M., Baker, M. L., John B., Chiu, W., and Sali, A. (2005). Structure characterization of components of protein assemblies by comparative modeling and electron cryo-microscopy. *J Struct Biol*, **149**: 191-203. PMID15681235.
- Carson, J. P., Eichele, G., and Chiu, W. (2005). A method for automated detection of gene expression required for the establishment of a digital transcriptome-wide gene expression atlas. *J Microsc*, **217**: 275-281. PMID15725131.
- Chiu, W., Baker, M.L., Jiang, W., Dougherty, M., and Schmid, M.F. (2005). Electron cryomicroscopy of biological machines at subnanometer resolution. *Structure*, **13**:363-372. PMID15766537.
- Sali, A. and Chiu, W. (2005). Macromolecular assemblies highlighted. *Structure*, **13**: 339-341.
- Ludtke, S. J., Serysheva, I.I., Hamilton, S. L., and Chiu, W. (2005). The pore structure of the closed RyR1 channel. *Structure*, **13**: 1203-11. PMC2983469.
- Moffat, K. and Chiu, W. (2005). Biophysical methods: bigger, finer, faster and dynamic. *Curr Opin Struct Biol*, **15**: 535-7.
- Carson, J.P., Ju, T., Lu, H.C., Thaller, C., Xu, M., Pallas, S.L., Crair, M.C., Warren, J., Chiu, W. and Eichele, G.. (2005). A Digital atlas to characterize the mouse brain transcriptome. *PLoS Comput Biol*, **1**:e41, pp 289-96. PMC1215388.
- Sitharaman, B., Kissell, K.R., Hartman, K.B., Tran, L.A., Baikalov, A., Rusakova, I., Sun, Y., Khant, H.A., Ludtke, S.J., Chiu, W., Laus, S., Toth, E., Helm, L., Merbach, A.E., and Wilson, L.J. (2005). Superparamagnetic gadonanotubes are high-performance MRI contrast agents. *Chem Commun*, **31**, 3915-7. PMID16075070.
- Cong, Y., Jiang, W., Birmanns, S., Zhou, Z.H., Chiu, W., and Wriggers, W. (2005). Fast rotational matching of single-particle images. *J Struct Biol*, **152**: 104-112. PMID16236526.
- Baker, M. L., Jiang, W., Rixon, F. J., and Chiu, W. (2005). Common ancestry of herpesviruses and tailed DNA bacteriophages. *J Virol*, **79**: 14967-70. PMID16282496.
- Paredes, A., Weaver, S., Watowich, S., and Chiu, W. (2005). Structural biology of old world and new world alphaviruses. *Arch Virol Suppl*, **19**: 179-85. PMID16358426.
- Passmore, L. A., Booth, C. R., Venien-Bryan, C., Ludtke, S. J., Fioretto, C., Johnson, L. N., Chiu, W., and Barford, D. (2005). Structural analysis of the anaphase-promoting complex reveals multiple active sites and insights into polyubiquitylation. *Mol Cell*, **20**: 855-66. PMID16364911.
- Jiang, W., Chang, J., Jakana, J. Weigele, P., King, J., and Chiu, W. (2006). Structure of epsilon15 bacteriophage reveals genome organization and DNA packaging/injection apparatus. *Nature*, **439**: 612-6. PMC1559657.
- Chiu, W., Baker, M.L., and Almo, S.C. (2006). Structural biology of cellular machines. *Trends Cell Biol* **16**:144-50. PMID16459078.

- Topf, M., Baker, M. L., Marti-Renom, M. A., Chiu, W., and Sali, A. (2006). Refinement of protein structures by iterative comparative modeling and cryoEM density fitting. *J Mol Biol*, **357**: 1655-68. PMID16490207.
- Arac, D., Chen, X., Khant, H. A., Ubach, J., Ludtke, S. J., Kikkawa, M., Johnson, A. E., Chiu, W., Sudhof, T. C., and Rizo, J. (2006). Close membrane-membrane proximity induced by Ca⁽²⁺⁾-dependent multivalent binding of synaptotagmin-1 to phospholipids. *Nat Struct Mol Biol*, **13**: 209-217. PMID16491093.
- Chang, J., Weigele, P., King, J., Chiu, W., and Jiang, W. (2006). Cryo-EM asymmetric reconstruction of bacteriophage P22 reveals organization of its DNA packaging and infecting machinery. *Structure*, **14**: 1073-1082. PMID16730179.
- Berman, H.M., Burley, S.K., Chiu, W., Sali, A., Adzhubei, A., Bourne, P.E., Bryant, S.H., Dunbrack, Jr., R.L., Fidelis, K., Frank, J., Godzik, A., Henrick, K., Joachimiak, A. Heymann, B., Jones, D., Markley, J.L., Moulton, J., Montelione, G.T., Orengo, C., Rossmann, M.G., Rost, B., Saibil, H., Schwede, T., Standley, D.M., and Westbrook, J.D. (2006). Outcome of a workshop on archiving structural models of biological macromolecules. *Structure*, **14**:1211-7. PMID16955948.
- Ju, T., Warren, J., Carson, J., Bello, M., Kakadiaris, I., Chiu, W., Thaller, C., and Eichele, G. (2006). 3D volume reconstruction of mouse brain from histological sections using warp filtering. *J Neuroscience Methods*, **156**: 84-100. PMID16580732.
- Chiu, W., Chen, D., Jakana, J., Chang, J., Jiang, W., Ludtke, S.L., and Baker, M.L. (2006). Visualization of biological nano-machines at subnanometer resolutions. *JEOL News*, **41**:12-17.
- Baker, M. L., Jiang, W., Wedemeyer, W. J., Rixon, F. J., Baker, D., and Chiu, W. (2006). *Ab initio* modeling of the Herpesvirus VP26 core domain assessed by cryoEM density. *PLoS Comput Biol*, **2**(11): e146. PMC1626159.
- Chen, D. H., Song, J. L., Chuang, D. T., Chiu, W., and Ludtke, S. J. (2006). An expanded conformation of single-ring GroEL-GroES complex encapsulates an 86 kDa substrate. *Structure*, **14**: 1711-22. PMID17098196.
- Schmid, M. F., Paredes, A. M., Khant, H. A., Soyer, F., Aldrich, H. C., Chiu, W., and Shively, J. M. (2006). Structure of *Halothiobacillus neapolitanus* carboxysomes by cryo-electron tomography. *J Mol Biol*, **364**: 526-535. PMC1839851.
- Marsh, M. P., Campos, S. K., Baker, M. L., Chen, C. Y., Chiu, W., and Barry, M. A. (2006). Cryoelectron microscopy of protein IX-modified adenoviruses suggests a new position for the C terminus of protein IX. *J Virol*, **80**: 11881-6. PMC1642590.
- Baker, M.L., Yu, Z., Chiu, W., and Bajaj, C. (2006). Automated segmentation of molecular subunits in electron cryomicroscopy density maps. *J Struct Biol*, **156**: 432-441. PMID16908194.
- Booth, C. R., Jakana, J., and Chiu, W. (2006). Assessing the capabilities of a 4kx4k CCD camera for electron cryo-microscopy at 300kV. *J Struct Biol*, **156**:556-563. PMID17067819.
- Jiang, W. and Chiu, W. (2007). Cryoelectron microscopy of icosahedral virus particles. *Methods Mol Biol*, **369**: 345-63. PMID17656759.
- Baker, M.L., Ju, T. and Chiu, W. (2007). Identification of secondary structure elements in intermediate resolution density maps. *Structure*, **15**:7-19. PMC1810566.
- Chang, J., Schmid, M.F., Rixon, F., and Chiu, W. (2007). Electron cryo-tomography reveals the portal in the herpesvirus capsid. *J Virol*, **81**: 2065-2068. PMC1797573.

- Serysheva, I. I., Chiu, W., and Ludtke, S.J. (2007). Single particle electron cryomicroscopy of the ion channels in the excitation-contraction coupling junction. *Methods in Cell Biol*, **79**: 407-35. PMID17327167.
- Johnson, J.E. and Chiu, W. (2007). DNA packaging and delivery machines in tailed bacteriophages. *Curr Opin Struct Biol*, **17**: 237-43. PMID17395453.
- Pope, W. H., Weigele, P. R., Chang, J., Pedulla, M. L., Ford, M. E., Houtz, J. M., Jiang, W., Chiu, W., Hatfull, G. F., Hendrix, R. W., and King, J. (2007). Genome sequence, structural proteins, and capsid organization of the cyanophage syn5: A "horned" bacteriophage of marine *Synechococcus*. *J Mol Biol*, **368**: 966-81. PMC2971696.
- Bello, M., Ju, T., Carson, J., Warren, J., Chiu, W., and Kakadiaris, I.A. (2007). Learning-based segmentation framework for tissue images containing gene expression data. *IEEE Trans on Med Imaging*, **26**: 728-44. PMID17518066.
- Ju, T., Baker, M.L., and Chiu, W. (2007). Computing a family of skeletons of volumetric models for shape description. *Computer-AIDED Design*, **39**:352-360. PMC2084352.
- Reissmann, S., Parnot, C., Booth, C.R., Chiu, W., and Frydman, J. (2007). Essential function of the built-in lid in the allosteric regulation of eukaryotic and archaeal chaperonins. *Nat Struct Mol Biol*, **14**: 432-40. PMC3339572.
- Glaeser, R.M., Downing, K., DeRosier, D., Chiu, W., and Frank, J. (2007). Electron crystallography of biological macromolecules. Oxford University Press, N.Y., N.Y.
- Liu, X., Jiang, W., Jakana, J., and Chiu, W. (2007). Averaging tens to hundreds of icosahedral particle images to resolve protein secondary structure elements using a Multi-path Simulated Annealing optimization algorithm. *J Struct Biol*, **160**:11-27. PMC2039893.
- Chen, D.H., Jakana, J. and Chiu, W. (2007). Single-particle cryo-EM data collected on a 300-kV liquid helium-cooled electron cryomicroscope. *J Chinese Elec Microsc Soc*, **26**: 473-479.
- Marsh, M.P., Chang, J. T. Booth, C. R., Liang N. L., Schmid, M. F. and Chiu, W. (2007). Modular software platform for low-dose electron microscopy and tomography. *J Microsc*, **228**: 384-389. PMID18045333.
- Chiu, W. and Moffat, K. (2007). Biophysical methods: structure, dynamics and gorgeous images. *Curr Opin Struct Biol*, **17**(5): 546-8. PMID17959374.
- Baker, M.L., Zhou, Z.H., and Chiu, W. (2007). Structure of phytoreovirus. In: Segmented double-stranded RNA viruses, structures and molecular biology. J.T. Patton ed., Caister Academic Press, Norfolk, UK, pp.89-104.
- Cong, Y., Topf, M., Sali, A., Matsudaira, P., Dougherty, M., Chiu, W., and Schmid, M.F. (2008). Crystallographic conformers of actin in a biologically active bundle of filaments. *J Mol Biol*, **375**: 331-6. PMC2680129.
- Topf, M., Lasker, K., Webb, B., Wolfson, H., Chiu, W., and Sali, A. (2008). Protein structure fitting and refinement guided by cryo-EM density. *Structure*, **16**: 295-307. PMC2409374.
- Ludtke, S.J., Baker, M.L., Chen, D.H., Song, J.L., Chuang, D.T., and W. Chiu (2008). De Novo Backbone trace of GroEL from single particle electron cryomicroscopy. *Structure*, **16**: 441-8. PMID18334219.
- Jiang, W., Baker, M.L., Jakana, J., Weigele, P.R., King, J., and Chiu, W. (2008). Backbone structure of the infectious epsilon15 virus capsid revealed by electron cryomicroscopy. *Nature*, **451**: 1130-4. PMC18305544.
- Chen, D.H., Jakana, J., Liu, X., Schmid, M.F., and Chiu, W. (2008). Achievable resolution from images of biological specimens acquired from a 4kx4k CCD camera in a 300-kV electron cryomicroscope. *J Struct Biol*, **163**:45-52. PMC2504495.

- Wu, G., Mikhailovsky, A., Khant, H.A., Fu, C., Chiu, W., and Zasadzinski, J.A. (2008). Remotely triggered liposome release by near-infrared light absorption via hollow gold nanoshells. *J Am Chem Soc*, **130**: 8175-8177. PMC2593911.
- Booth, C.R., Meyer, A.S., Cong, Y., Topf, M., Sali, A., Ludtke, S.J., Chiu, W., and Frydman, J. (2008). Mechanism of lid closure in the eukaryotic chaperonin TRiC/CCT. *Nat Struct Mol Biol*, **15**: 746-53. PMC2546500.
- Chiu, W., Chang, J. T., and Rixon, F. J. (2008). Cryo-electron microscopy. *Encyclopedia Virol* 3rd Edition, B.W.J. Mahy and M.H.V. Van Regenmortel, Eds, Elsevier, Oxford, UK. **1**: 603-614.
- Serysheva, I.I., Ludtke, S.J., Baker, M.L., Cong, Y., Topf, M., Eramian, D., Sali, A., Hamilton, S.L., and Chiu, W. (2008). Subnanometer-resolution electron cryomicroscopy-based domain models for the cytoplasmic region of skeletal muscle RyR channel. *Proc Natl Acad Sci USA*, **105**: 9610-5. PMC2474495.
- Abeyasinghe, S., Ju, T., Baker, M. L., and Chiu, W. (2008). Shape modeling and matching in identifying protein structure from low-resolution images. *Computer-AIDED Design*, **39**: 352-360.
- Chen, D.H., Luke, K., Zhang, J., Chiu, W., and Wittung-Stafshede, P. (2008). Location and flexibility of the unique C-terminal tail of Aquifex aeolicus co-chaperonin protein 10 as derived by cryo-EM and biophysical techniques. *J Mol Biol*, **381**: 707-17. PMC2612737.
- Zhang, J., Nakamura, N., Shimizu, Y., Liang, N., Liu, X., Jakana, J., Marsh, M.P., Booth, C.R., Shinkawa, T., Nakata, M., and Chiu, W. (2009). JADAS: A customizable automated cryo-EM data acquisition system and its application to ice-embedded single particles. *J Struct Biol*, **165**: 1-9. PMC2634810.
- Baker, M. L., Marsh, M. P., and Chiu, W. (2009). Cryo-EM of molecular nanomachines and cells. *Nanotechnology*, ed. Viola Vogel, Wiley VCH, Verlag GmbH & Co. KGaA Weinheim. **5**:91-111.
- Zhang, R., Hu, X., Khant, H., Ludtke, S.J., Chiu, W., Schmid, M.F., Frieden, C., and Lee, J.M. (2009). Inter-protofilament interactions between Alzheimer's A β ₁₋₄₂ peptides in amyloid fibrils revealed by cryo-EM. *PNAS*, **106**: 4653-4658. PMC2660777.
- Pintilie, G., Zhang, J., Chiu, W., and Gossard, D. (2009). Identifying Components in 3D Density Maps of Protein Nanomachines by Multi-scale Segmentation. *IEEE NIH Life Sci Syst Appl Workshop*, 44-47. PMC2885738.
- Yang, C., Jiang, W., Chen, D.H., Umesh, A., Ng, E. G., and Chiu, W. (2009). Estimating contrast transfer function and associated parameters by constrained nonlinear optimization. *J Microsc*, **233**: 391-403. PMC2804061.
- Cong, Y., Zhang, Q., Woolford, D., Schweikardt, T., Khant, H., Dougherty, M., Ludtke, S.J., Chiu, W., and Decker, H. (2009). Structural mechanism of SDS-induced enzyme activity of scorpion hemocyanin revealed by electron cryomicroscopy. *Structure*, **17**(5): 749-58. PMC2705691.
- Wu, G., Khant, H. A., Chiu, W., and Lee, K.Y. C. (2009). Effects of bilayer phases on phospholipid-ploxamer interactions. *Soft Matter*, **5**: 1496-1503.
- DiMaio, F., Tyka, M. D., Baker, M.L, Chiu, W., and Baker, D. (2009). Refinement of protein structures into low-resolution density maps using Rosetta. *J Mol Biol*, **392**: 181-90. PMC1959633.
- Bammes, B.E., Jakana, J., Schmid, M.F., and Chiu, W. (2010). Radiation damage effects at four specimen temperatures from 4 to 100K. *J Struct Biol*, **169**: 331-341. PMC2826528.

- Zhang, J., Baker, M.L., Schröder, G.F., Douglas, N.R., Reissmann, S., Jakana, J., Dougherty, M., Fu, C.F., Levitt, M., Ludtke, S.J., Frydman, J., and Chiu, W. (2010). Mechanism of folding chamber closure in a group II chaperonin. *Nature*, **463**: 379-383. PMC2834796.
- Ren, G., Rudenko, G., Ludtke, S.J., Deisenhofer, J., Chiu, W., and Pownall, H.J. (2010). Model of human low-density lipoprotein and bound receptor based on cryoEM. *Proc Natl Acad Sci USA*, **107**: 1059-64. PMC2798884.
- Cong, Y., Baker, M. L., Jakana, J., Woolford, D., Miller, E.J., Reissmann, S., Kumar, R. N., Redding-Johanson, A. M., Batth, T.S., Mukhopadhyay, A., Ludtke, S. J., Frydman, J., and Chiu, W. (2010). 4.0 Å resolution cryo-EM structure of the mammalian chaperonin TRiC/CCT reveals its unique subunit arrangement. *Proc Natl Acad Sci USA*, **107**: 4967–4972. PMC2841888.
- Carson, J., Ju, T., Bello, M., Thaller, C., Warren, J., Kakadiaris, I.A., Chiu, W., and Eichele, G. (2010). Automated pipeline for atlas-based annotation of gene expression patterns: Application to postnatal day 7 mouse brain. *Methods*, **50**: 85-95. PMC2818703.
- Pintilie, G.D., Zhang, J., Goddard, T.D., Chiu, W., and Gossard, D.C. (2010). Quantitative analysis of cryo-EM density map segmentation by watershed and scale-space filtering and fitting of structures by alignment to regions. *J Struct Biol*, **170**(3):427-38. PMC2874196.
- Nakamura, N., Shimizu, Y., Shinkawa, T., Nakata, M., Bammes, B., Zhang, J., and Chiu, W. (2010). Automated specimen search in cryo-TEM observation with DIFF-defocus imaging. *J Electron Microscop*, **59**(4):299-310. PMC3388909.
- Saha, M., Levitt, M., and Chiu, W. (2010). MOTIF-EM: an automated computational tool for identifying conserved regions in cryoEM structures. *Bioinformatics*, **26**(12):i301-9. PMC2881380.
- Haspel, N., Moll, M., Baker, M.L., Chiu, W., and Kavraki, L.E. (2010). Tracing conformational changes in proteins. *BMC Struct Biol*, **10** Suppl 1:S1. PMC2873824.
- Liu, X., Zhang, Q., Murata, K., Baker, M. L., Sullivan, M.B., Fu, C., Dougherty, M. Schmid, M. F., Osburne, M.S., Chisholm, S.W., and Chiu, W. (2010). Structural changes in a marine Podovirus associated with release of its genome into *Prochlorococcus*. *Nature Struct and Mol Biol*, **17**: 830-836. PMC2924429.
- Miyazaki, Y., Irobalieva, R.N., Tolbert, B.S., Smalls-Mantey, A., Iyalla, K., Loeliger, K., D'Souza, V., Khant, H., Schmid, M.F., Garcia, E.L., Telesnitsky, A., Chiu, W., and Summers. (2010). Structure of a conserved retroviral RNA packaging element by NMR spectroscopy and cryo-electron tomography. *J Mol Biol*, **404**:751-72. PMC3023341.
- Murata, K., Liu, X., Danev, R., Jakana, J., Schmid, M.F., King, J., Nagayama, K., and Chiu, W. (2010). Zernike phase contrast cryo-electron microscopy and tomography for structure determination at nanometer and subnanometer resolutions. *Structure*, **18**(8):903-912. PMC2925294.
- Chang, J.T., Schmid, M.F., Haase-Pettingell, C., Weigele, P.R., King, J.A., and Chiu, W. (2010). Visualizing the structural changes of bacteriophage Epsilon15 and its Salmonella host during infection. *J Mol Biol*, **402**: 731-740. PMC3164490.
- Baker, M.L., Zhang, J., Ludtke, S.J., and Chiu, W. (2010). Cryo-EM of macromolecular assemblies at near atomic resolution. *Nature Protocols*, **5**: 1697-1708. PMCID3107675.
- Baird, N. J., Ludtke, S.J., Khant, H., Chiu, W., Pan, T., and Sosnick, T.R. (2010). Discrete structure of an RNA folding intermediate revealed by cryo-electron microscopy. *J Am Chem Soc*, **132**:16352-3. PMC2988076.
- Abeyasinghe, S., Baker, M.L., Chiu, W., and Ju, T. (2010). Semi-isometric registration of line features for flexible fitting of protein structures. *Computer graphics forum: journal of the European Association for Computer Graphics* **29**: 2243-2252. PMCID 2993115
- Bromberg, S., Chiu, W., and Ferrin, T. (2010). Workshop on molecular animation. *Structure*, **18**(10): 1261-1265. PMC3071847.

- Rochat, R. H., Liu, X., Murata, K., Nagayama, K., Rixon, F.J., and Chiu, W. (2011). Seeing the portal in herpes simplex virus type 1 B capsids. *J Virol*, **85**:1871-4. PMC3028901.
- Chen, D. H., Baker, M.L., Hryc, C.F., Dimaio, F., Jakana, J., Wu, W., Dougherty, M., Haase-Pettingell, C., Schmid, M.F., Jiang, W., Baker, D., King, J.A., and Chiu, W. (2011). Structural basis for scaffolding-mediated assembly and maturation of a dsDNA virus. *Proc Natl Acad Sci USA*, **108**:1355-60. PMC3029737.
- Douglas, N. R., Reissmann, S., Zhang, J., Chen, B., Jakana, J., Kumar, R., Chiu, W., and Frydman, J. (2011). Dual action of ATP hydrolysis couples lid closure to substrate release into the group II chaperonin chamber. *Cell*, **144**:240-52. PMC3055171.
- Knee, K. M., Goulet, D.R., Zhang, J., Chen, B., Chiu, W., and King, J.A. (2011). The group II chaperonin Mm-Cpn binds and refolds human gammaD crystallin. *Protein Sci*, **20**:30-41. PMC3047059.
- Lawson, C. L., Baker, M.L., Best, C., Bi, C., Dougherty, M., Feng, P., van Ginkel, G., Devkota, B., Lagerstedt, I., Ludtke, S.J., Newman, R.H., Oldfield, T.J., Rees, I., Sahni, G., Sala, R., Velankar, S., Warren, J., Westbrook, J.D., Henrick, K., Kleywegt, G.J., Berman, H.M., and Chiu, W. (2011). EMDatabank.org: unified data resource for CryoEM. *Nucleic Acids Res*, **39**:D456-64. PMC3013769.
- Ludtke, S. J., Lawson, C.L., Kleywegt, G.J., Berman, H.M., and Chiu, W. (2011). Workshop on the validation and modeling of electron cryo-microscopy structures of biological nanomachines-Workshop Introduction. *Pac Symp Biocomput*, 369-73. Open Access: http://dx.doi.org/10.1142/9789814335058_0039.
- Baker, M. L., Abeyasinghe, S.S., Schuh, S., Coleman, R.A., Abrams, A., Marsh, M.P., Hryc, C.F., Ruths, T., Chiu, W., and Ju, T. (2011). Modeling protein structure at near atomic resolutions with Gorgon. *J Struct Biol*, **174**: 360-73. PMC3078171.
- Ludtke, S.J. and Chiu, W. (2011) Electron cryomicroscopy and three-dimensional computer reconstruction of biological molecules. In: eLS 2011, John Wiley & Sons, Ltd: Chichester <http://www.els.net/> [DOI: 10.1002/9780470015902.a0002987.pub2].
- Zhang, J., Ma, B., Dimaio, F., Douglas, N. R., Joachimiak, L.A., Baker, D., Frydman, J., Levitt, M., and Chiu, W. (2011). Cryo-EM Structure of a Group II Chaperonin in the Prehydrolysis ATP-Bound State Leading to Lid Closure. *Structure*, **19**:633-639. PMCID3705922.
- Bammes, B. E., Rochat, R. H., Jakana, J., and Chiu, W. (2011). Practical performance evaluation of a 10k × 10k CCD for electron cryo-microscopy. *J Struct Biol*, **175**: 384-393. PMC3150461.
- Ludtke, S. J., Tran, T. P., Ngo, Q. T., Moiseenkova-Bell, V. Y., Chiu, W., and Serysheva, I. (2011). Flexible Architecture of IP(3)R1 by Cryo-EM. *Structure*, **19**: 1192-9, PMC3154621.
- Koyfman, A. Y., Schmid, M. F., Gheiratmand, L., Fu, C. J., Khant, H. A., Huang, D., He, C. Y., and Chiu, W. (2011). Structure of Trypanosoma brucei flagellum accounts for its bihelical motion. *Proc Natl Acad Sci USA*, **108**: 11105-8. PMC3131312.
- Kostyuchenko, V. A., Jakana, J., Liu, X., Haddow, A. D., Aung, M., Weaver, S. C., Chiu, W., and Lok, S. M. (2011). The 6 Å resolution cryo-EM Barmah Forest virus structure shows detailed transmembrane proteins architecture and interactions. *J Virol*, **85**: 9327-9333. PMC3165765.
- Hryc, C.F., Chen, D., and Chiu, W. (2011). Near-atomic resolution cryo-EM for molecular virology. *Curr Opin in Virology*, **1**: 110-117. PMC3155204.
- Zhang, R., Hryc, C. F., Cong, Y., Liu, X., Jakana, J., Gorchakov, R., Baker, M. L., Weaver, S. C., and Chiu, W. (2011). 4.4 Å cryo-EM structure of an enveloped alphavirus Venezuelan equine encephalitis virus. *The EMBO J*, **30**(18): 3854-3863. PMC3173789.

- Qin, G., Li, Z., Xia, R., Li, F., O'Neill, B. E., Goodwin, J. T., Khant, H. A., Chiu, W., and Li, K. C. (2011) Partially polymerized liposomes: stable against leakage yet capable of instantaneous release for remote controlled drug delivery. *Nanotechnology*, **22**:155605. PMC3157042.
- Moon, J.J., Suh, H., Bershteyn, A., Stephan, M.T., Liu, H, Huang, B, Sohail, M., Luo, S., Um, S.H., Khant, H., Goodwin, J.T., Ramos, J., Chiu, W., and Irvine D.J. (2011). Interbilayer-crosslinked multilamellar vesicles as synthetic vaccines for potent humoral and cellular immune responses. *Nature Mater*, **10**:243-51. PMC3077947.
- Cong, Y., Schröder, G.F., Meyer, A.S., Jakana, J., Ma, B, Dougherty, M.T., Schmid, M.F., Reissmann, S., Levitt, M., Ludtke, S.L., Frydman, J., and Chiu, W. (2011). Symmetry-free cryo-EM structures of the chaperonin TRiC along its ATPase-driven conformational cycle. *The EMBO J*, **31**(3): 720-730. PMC3273382.
- Kim, T.H., Mount, C.W., Dulken, B.W., Ramos, J., Fu, C.J., Khant, H.A., Chiu, W., Gombotz, W.R., and Pun, S.H. (2012). Filamentous, mixed micelles of triblock copolymers enhance tumor localization of indocyanine green in a murine xenograft model. *Mol Pharm*, **9**:135-143. PMC3256244.
- Chang, J., Liu, X., Rochat, R.H., Baker, M.L., and Chiu, W. (2012). Reconstructing virus structures from nanometer to near-atomic resolutions with cryo-electron microscopy and tomography. *Adv Exp Med Biol*, **726**:49-90. PMID 22297510.
- Bammes, B.E., Rochat, R.H., Jakana, J., Chen, D.H., and Chiu, W. (2012). Direct electron detection yields cryo-EM reconstructions at resolutions beyond 3/4 Nyquist frequency. *J Struct Bio*, **177**: 589-601. PMC3314222.
- Rochat, R.H. and W. Chiu (2012). Cryo-Electron Microscopy and Tomography of Virus Particles. In: Biophysical Techniques for Structural Characterization of Macromolecules, Edward H. Egelman, editor: Comprehensive Biophysics. Academic Press, Oxford. **1**: pp. 311-340.
- Fauerbach, J.A., Yushchenko, D.A., Shahmoradian, S.H., Chiu, W., Jovin, T.M., and Jares-Erijman, E.A. (2012). Supramolecular non-amyloid intermediates in the early stages of alpha-synuclein aggregation. *Biophys J*, **102**: 1127-1136. PMC3296045
- Stone, R.L., Nick, A.M., McNeish, I.A., Balkwill, F., Han, H.D., Bottsford-Miller, J., Rupaimoole, R., Armaiz-Pena, G.N., Pecot, C.V., Coward, J., Deavers, M.T., Vasquez, H.G., Urbauer, D., Landen, C.N., Hu, W., Gershenson, H., Matsuo, K., Shahzad, M.M., King, E.R., Tekedereli, I., Ozpolat, B., Ahn, E.H., Bond, V.K., Wang, R., Drew, A.F., Gushiken, F., Collins, K., DeGeest, K., Lutgendorf, S.K., Chiu, W., Lopez-Berestein, G., Afshar-Kharghan, V., and Sood, A.K. (2012). Paraneoplastic thrombocytosis in ovarian cancer. *N Engl J Med*, **366**: 610-618. PMC3296780.
- Leitner, A., Joachimiak, L.A., Bracher, A., Monkemeyer, L., Walzthoeni, T., Chen, B., Pechmann, S., Holmes, S., Cong, Y., Ma, B., Ludtke, S., Chiu, W., Hartl, F.U., Aebersold, R. and Frydman, J. (2012). The molecular architecture of the eukaryotic chaperonin TRiC/CCT. *Structure*, **20**, 814-825. PMID 23350567
- Pintilie, G. and Chiu, W. (2012). Comparison of Segger and other methods for segmentation and rigid-body docking of molecular components in Cryo-EM density maps. *Biopolymers*, **97**: 742-760. PMID3402182.
- Baker, M. L., Baker, M. R., Hryc, C. F., Ju, T. and Chiu, W. (2012). Gorgon and pathwalking: Macromolecular modeling tools for subnanometer resolution density maps. *Biopolymers*, **97**:655-668. PMID3899894.
- Baker, M. R., Rees, I., Ludtke, S. J., Chiu, W. and Baker, M. L. (2012). Constructing and validating initial C α models from subnanometer resolution density maps with pathwalking. *Structure*, **20**: 450-463. PMC3307788.
- Ludtke, S. J., Lawson, C. L., Kleywegt, G. J., Berman, H. and Chiu, W. (2012). The 2010 cryo-em modeling challenge. *Biopolymers*, **97**: 651-654. PMID in progress.

- Ni, P. Wang, Z., Ma, X., Das, N. C., Sokol, P., Chiu, W., Dragnea, B., Hagan, M. and Kao, C. C. (2012). An examination of the electrostatic interactions between the N-terminal tail of the Brome Mosaic Virus coat protein and encapsidated RNAs. *J Mol Biol*, **419**: 284-300. PMC3360812.
- Henderson, R., Sali, A., Baker, M.L., Carragher, B., Devkota, B., Downing, K.H., Egelman, E.H., Feng, Z., Frank, J., Grigorieff, N., Jiang, W., Ludtke, S.J., Medalia, O., Penczek, P.A., Rosenthal, P.B., Rossmann, M.G., Schmid, M.F., Schroder, G.F., Steven, A.C., Stokes, D.L., Westbrook, J.D., Wriggers, W., Yang, H., Young, J., Berman, H.M., Chiu, W., Kleywegt, G.J. and Lawson, C.L. (2012). Outcome of the first electron microscopy validation task force meeting. *Structure*, **20**: 205-214. PMC3328769.
- Schmid, M. F, Hecksel, C.W., Rochat, R.H., Bhella, D., Chiu, W. and Rixon, F.J. (2012). A tail-like assembly at the portal vertex in intact herpes simplex type-1 virions. *PLOS Pathogens*, **8**:e1002961. PMC3464221.
- Gilliam, J. C., J. T. Chang, I. M. Sandoval, Y. Zhang, T. Li, S. J. Pittler, W. Chiu and T. G. Wensel (2012). Three-dimensional architecture of the rod sensory cilium and its disruption in retinal neurodegeneration. *Cell*, **151**(5): 1029-1041. PMCID 3582337.
- Rees, I, Langley, E, Chiu, W, & Ludtke, SJ (2013) EMEN2: an object oriented database and electronic lab notebook. *Microscopy and microanalysis* **19**(1):1-10. PMCID3907281.
- Murray, SC, Flanagan, J, Popova, OB, Chiu, W, Ludtke, SJ, & Serysheva, II (2013) Validation of Cryo-EM Structure of IP3R1 Channel. *Structure* **21**(6):900-909. PMCID3696195.
- Zhang, Q., Dai, X., Cong, Y., Zhang, J., Chen, D. H., Dougherty, M. T., Wang, J., Ludtke, S. J., Schmid, M. F. & Chiu, W. (2013). Cryo-EM structure of a molluscan hemocyanin suggests its allosteric mechanism. *Structure* **21**, 604-13. PMCID 3657317.
- DiMaio, F, Zhang, J, Chiu, W, & Baker, D (2013) Cryo-EM model validation using independent map reconstructions. *Protein science* **22**(6):865-868. PMCID3690725.
- Chen, DH, Madan, D, Weaver, J, Lin, Z, Schroder, GF, Chiu, W, & Rye, HS (2013) Visualizing GroEL/ES in the Act of Encapsulating a Folding Protein. *Cell* **153**(6):1354-1365. PMCID3695626.
- Baker, ML, Hryc, CF, Zhang, Q, Wu, W, Jakana, J, Haase-Pettingell, Cameron, A, V., P, Adams, PD, King, JA, Jiang, W, & Chiu, W. (2013) Validated near-atomic resolution structure of bacteriophage epsilon15 derived from cryo-EM and modeling. *Proc Nat'l Acad Sci USA* **110**(30):12301-12306. PMCID 3725109.
- Shahmoradian, SH, Galaz-Montoya, JG, Schmid, MF, Cong, Y, Ma, B, Spiess, C, Frydman, J, Ludtke, SJ, & Chiu, W (2013) TRiC's tricks inhibit huntingtin aggregation. *eLife* **2**:e00710. PMCID3707056.
- Dai, W, Fu, CJ, Raytcheva, D, Flanagan, J, Khant, HA, Liu, X, Rochat, RH, Haase-Pettingell, C, Piret, J, Ludtke, SJ, Nagayama, K, Schmid, MF, King, JA & Chiu, W (2013) Visualizing virus assembly intermediates inside marine cyanobacteria. *Nature* **502**: 707-710. PMCID3984937.
- Hoersch D, Roh SH, Chiu W, Kortemme T (2013) Reprogramming an ATP-driven protein machine into a light-gated nanocage. *Nature Nanotechnology* **8**: 928-932. PMCID3859876.
- Wagner, G and Chiu, W (2013) Exploring new limits in complex biological structures. *Current Opinion in Structural Biology* **23**: 704-706.
- Dai, W, Schmid, MF, King, JA, & Chiu, W (2014) Identifying the assembly pathway of cyanophage inside the marine bacterium using electron cryo-tomography. *Microbial cell* **1**(1):45-47. PMCID4238041.
- Shahmoradian, SH, Galiano, MR, Wu, C, Chen, S, Rasband, MN, Mobley, WC, Chiu, W (2014). Preparation of primary neurons for visualizing neurites in a frozen-hydrated state using cryo-electron tomography. *J. Vis. Exp.* (84), e50783, doi:10.3791/50783. PMCID3707056.
- Du, D, Wang, Z, James, NR, Voss, JE, Klimont, E, Ohene-Agyei, T, Venter, H, Chiu, W, & Luisi,

- BF (2014) Structure of the AcrAB-TolC multidrug efflux pump. *Nature* **509**(7501):512-515. PMID4361902.
- Kasembeli, M, Lau, WC, Roh, SH, Eckols, TK, Frydman, J, Chiu, W, & Tweardy, DJ (2014) Modulation of STAT3 folding and function by TRiC/CCT chaperonin. *PLoS Biology* **12**(4):e1001844. PMID3995649.
- Bakthavatsalam, D, Soung, RH, Tweardy, DJ, Chiu, W, Dixon, RA, & Woodside, DG (2014) Chaperonin-containing TCP-1 complex directly binds to the cytoplasmic domain of the LOX-1 receptor. *FEBS letters* **588**(13):2133-2140. PMID4100626.
- Chiu, W, Crepin, T, & Ruigrok, RW (2014) Editorial overview: Virus structure and function. *Current opinion in virology* **5**:viii-ix. PMID637221.
- Rochat, RH, Hecksel, CW, & Chiu, W (2014) Cryo-EM techniques to resolve the structure of HSV-1 capsid-associated components. *Methods in molecular biology* **1144**:265-281. PMID PMC4370171.
- Rizzo, AA, Suhanovsky, MM, Baker, ML, Fraser, LC, Jones, LM, Rempel, DL, Gross, ML, Chiu, W, Alexandrescu, AT, & Teschke, CM (2014) Multiple functional roles of the accessory I-domain of bacteriophage P22 coat protein revealed by NMR structure and CryoEM modeling. *Structure* **22**(6):830-841. PMID4068711.
- Gipson, P, Baker, ML, Raytcheva, D, Haase-Pettingell, C, Piret, J, King, JA, & Chiu, W (2014) Protruding knob-like proteins violate local symmetries in an icosahedral marine virus. *Nature Communications* **5**:4278. PMID4102127.
- Guo, YR, Hryc, CF, Jakana, J, Jiang, H, Wang, D, Chiu, W, Zhong, W, & Tao, YJ (2014) Crystal structure of a nematode-infecting virus. *Proc Natl Acad Sci USA*. **111**(35): 12781-12786. PMID4156749.
- Dai, W, Fu, C, Khant, HA, Ludtke, SJ, Schmid, MF, & Chiu, W (2014) Zernike phase-contrast electron cryotomography applied to marine cyanobacteria infected with cyanophages. *Nature protocols* **9**(11):2630-2642. PMID4371552.
- Wang, Z, Hryc, CF, Bammes, B, Afonine, PV, Jakana, J, Chen, DH, Liu, X, Baker, ML, Kao, C, Ludtke, SJ, Schmid, MF, Adams, PD, & Chiu, W (2014) An atomic model of bromo mosaic virus using direct electron detection and real-space optimization. *Nature Communications* **5**:4808. PMID4155512.
- Guo, F, Liu, Z, Fang, PA, Zhang, Q, Wright, ET, Wu, W, Zhang, C, Vago, F, Ren, Y, Jakana, J, Chiu, W, Serwer, P, & Jiang, W (2014) Capsid expansion mechanism of bacteriophage T7 revealed by multistate atomic models derived from cryo-EM reconstructions. *Proc Natl Acad Sci U S A* **111**(43):E4606-4614. PMID4217468.
- Hong, C, Oksanen, HM, Liu, X, Jakana, J, Bamford, DH, & Chiu, W (2014) A structural model of the genome packaging process in a membrane-containing double stranded DNA virus. *PLoS biology* **12**(12):e1002024. PMID4267777.
- Patwardhan, A, Ashton, A, Brandt, R, Butcher, S, Carzaniga, R, Chiu, W, Collinson, L, Doux, P, Duke, E, Ellisman, MH, Franken, E, Grunewald, K, Heriche, JK, Koster, A, Kuhlbrandt, W, Lagerstedt, I, Larabell, C, Lawson, CL, Saibil, HR, Sanz-Garcia, E, Subramaniam, S, Verkade, P, Swedlow, JR, & Kleywegt, GJ (2014) A 3D cellular context for the macromolecular world. *Nature structural & molecular biology* **21**(10):841-845. PMID4346196.
- Hong, C, Pietila, MK, Fu, CJ, Schmid, MF, Bamford, DH, & Chiu, W (2015) Lemon-shaped halo archaeal virus His1 with uniform tail but variable capsid structure. *Proceedings of the National Academy of Sciences of the United States of America* **112**(8):2449-2454. PMID4345568.
- Auguste, AJ, Kaelber, JT, Fokam, EB, Guzman, H, Carrington, CV, Erasmus, JH, Kamgang, B, Popov, VL, Jakana, J, Liu, X, Wood, TG, Widen, SG, Vasilakis, N, Tesh, RB, Chiu, W, & Weaver, SC (2015) A newly isolated reovirus has the simplest genomic and structural

- organization of any reovirus. *Journal of virology* **89**(1):676-687. PMID4301156.
- Yi, P, Wang, Z, Feng, Q, Pintilie, GD, Foulds, CE, Lanz, RB, Ludtke, SJ, Schmid, MF, Chiu, W, & O'Malley, BW (2015) Structure of a biologically active estrogen receptor-coactivator complex on DNA. *Molecular cell* **57**(6):1047-1058. PMID4369429.
- Leung, DW, Borek, D, Luthra, P, Binning, JM, Anantpadma, M, Liu, G, Harvey, IB, Su, Z, Endlich-Frazier, A, Pan, J, Shabman, RS, Chiu, W, Davey, RA, Otwinowski, Z, Basler, CF, & Amarasinghe, GK (2015) An Intrinsically Disordered Peptide from Ebola Virus VP35 Controls Viral RNA Synthesis by Modulating Nucleoprotein-RNA Interactions. *Cell reports* **11**(3):376-389. PMID4599368.
- Marabini, R, Carragher, B, Chen, S, Chen, J, Cheng, A, Downing, KH, Frank, J, Grassucci, RA, Bernard Heymann, J, Jiang, W, Jonic, S, Liao, HY, Ludtke, SJ, Patwari, S, Piotrowski, AL, Quintana, A, Sorzano, CO, Stahlberg, H, Vargas, J, Voss, NR, Chiu, W, & Carazo, JM (2015) CTF Challenge: Result summary. *Journal of structural biology* **190**(3):348-359. PMID4672951.
- Tan, Z, Dai, W, van Erp, TG, Overman, J, Demuro, A, Digman, MA, Hatami, A, Albay, R, Sontag, EM, Potkin, KT, Ling, S, Macciardi, F, Bunney, WE, Long, JD, Paulsen, JS, Ringman, JM, Parker, I, Glabe, C, Thompson, LM, Chiu, W, & Potkin, SG (2015) Huntington's disease cerebrospinal fluid seeds aggregation of mutant huntingtin. *Molecular psychiatry* **20**(11):1286-1293. PMID 4718563.
- Darrow, MC, Sergeeva, OA, Isas, JM, Galaz-Montoya, JG, King, JA, Langen, R, Schmid, MF, & Chiu, W (2015) Structural mechanisms of mutant huntingtin aggregation suppression by the synthetic chaperonin-like cct5 complex explained by cryoelectron tomography. *The Journal of biological chemistry* **290**(28):17451-17461. PMID4498080.
- Sali, A, Berman, HM, Schwede, T, Trewhella, J, Kleywegt, G, Burley, SK, Markley, J, Nakamura, H, Adams, P, Bonvin, AM, Chiu, W, Peraro, MD, Di Maio, F, Ferrin, TE, Grunewald, K, Gutmanas, A, Henderson, R, Hummer, G, Iwasaki, K, Johnson, G, Lawson, CL, Meiler, J, Marti-Renom, MA, Montelione, GT, Nilges, M, Nussinov, R, Patwardhan, A, Rappsilber, J, Read, RJ, Saibil, H, Schroder, GF, Schwieters, CD, Seidel, CA, Svergun, D, Topf, M, Ulrich, EL, Velankar, S, & Westbrook, JD (2015) Outcome of the First wwPDB Hybrid/Integrative Methods Task Force Workshop. *Structure* **23**(7):1156-1167. PMID4933300
- Irobalieva, RN, Fogg, JM, Catanese, DJ, Sutthibutpong, T, Chen, M, Barker, AK, Ludtke, SJ, Harris, SA, Schmid, MF, Chiu, W, & Zechiedrich, L (2015) Structural diversity of supercoiled DNA. *Nature communications* **6**:8440. PMID4608029.
- Fan, G, Baker, ML, Wang, Z, Baker, MR, Sinyagovskiy, PA, Chiu, W, Ludtke, SJ, & Serysheva, II (2015) Gating machinery of InsP3R channels revealed by electron cryomicroscopy. *Nature* **527**(7578):336-341. PMID 26458101.
- Lawson, CL, Patwardhan, A, Baker, ML, Hryc, C, Garcia, ES, Hudson, BP, Lagerstedt, I, Ludtke, SJ, Pintilie, G, Sala, R, Westbrook, JD, Berman, HM, Kleywegt, GJ, & Chiu, W (2016) EMDatabank unified data resource for 3DEM. *Nucleic acids research* **44**(D1):D396-403. PMID4702818.
- Galaz-Montoya, JG, Hecksel, CW, Baldwin, PR, Wang, E, Weaver, SC, Schmid, MF, Ludtke, SJ, & Chiu, W (2016) Alignment algorithms and per-particle CTF correction for single particle cryo-electron tomography. *Journal of structural biology* **194**(3):383-394. PMID4846534.
- Pintilie, G, Chen, DH, Haase-Pettingell, CA, King, JA, & Chiu, W (2016) Resolution and Probabilistic Models of Components in CryoEM Maps of Mature P22 Bacteriophage. *Biophysical journal* **110**(4):827-839. PMID4775875.
- Roh, SH, Kasembeli, M, Galaz-Montoya, JG, Trnka, M, Lau, WC, Burlingame, A, Chiu, W, & Tweardy, DJ (2016) Chaperonin TRiC/CCT Modulates the Folding and Activity of

- Leukemogenic Fusion Oncoprotein AML1-ETO. *The Journal of biological chemistry* **291**(9):4732-4741. PMID4813495.
- Marabini, R, Ludtke, SJ, Murray, SC, Chiu, W, de la Rosa-Trevin, JM, Patwardhan, A, Heymann, JB, & Carazo, JM (2016) The Electron Microscopy eXchange (EMX) initiative. *Journal of structural biology* **194**(2):156-163. PMID in progress.
- Hecksel, CW, Darrow, MC, Dai, W, Galaz-Montoya, JG, Chin, JA, Mitchell, PG, Chen, S, Jakana, J, Schmid, MF, & Chiu, W (2016) Quantifying Variability of Manual Annotation in Cryo-Electron Tomograms. *Microsc Microanal* **22**(3):487-496. PMID5111626.
- Veneziano, R, Ratanalert, S, Zhang, K, Zhang, F, Yan, H, Chiu, W, & Bathe, M (2016) Designer nanoscale DNA assemblies programmed from the top down. *Science* **352**(6293):1534. PMID5111087.
- Li, H, Zhang, K, Pi, F, Guo, S, Shlyakhtenko, L, Chiu, W, Shu, D, & Guo, P (2016) Controllable Self-Assembly of RNA Tetrahedrons with Precise Shape and Size for Cancer Targeting. *Adv Mater* **28**(34):7501-7507. PMID5059845.
- DiMaio, F & Chiu, W (2016) Tools for Model Building and Optimization into Near-Atomic Resolution Electron Cryo-Microscopy Density Maps. *Methods Enzymol* **579**:255-276. PMID5103630
- Roh, SH, Kasembeli, MM, Galaz-Montoya, JG, Chiu, W, & Tweardy, DJ (2016) Chaperonin TRiC/CCT Recognizes Fusion Oncoprotein AML1-ETO through Subunit-Specific Interactions. *Biophys J* **110**(11):2377-2385. PMID4906440.
- Darrow, MC, Zhang, Y, Cinquin, BP, Smith, EA, Boudreau, R, Rochat, RH, Schmid, MF, Xia, Y, Larabell, CA, & Chiu, W (2016) Visualizing red blood cell sickling and the effects of inhibition of sphingosine kinase 1 using soft X-ray tomography. *J Cell Sci* **129**(18):3511-3517. PMID5047677.
- Zhao, X, Chen, XQ, Han, E, Hu, Y, Paik, P, Ding, Z, Overman, J, Lau, AL, Shahmoradian, SH, Chiu, W, Thompson, LM, Wu, C, & Mobley, WC (2016) TRiC subunits enhance BDNF axonal transport and rescue striatal atrophy in Huntington's disease. *Proc Natl Acad Sci U S A* **113**(38):E5655-5664. PMID5035849.
- Shen, K, Calamini, B, Fauerbach, JA, Ma, B, Shahmoradian, SH, Serrano Lachapel, IL, Chiu, W, Lo, DC, & Frydman, J (2016) Control of the structural landscape and neuronal proteotoxicity of mutant Huntingtin by domains flanking the polyQ tract. *Elife* **5**. PMID5135392.
- Khisamutdinov, EF, Jasinski, DL, Li, H, Zhang, K, Chiu, W, & Guo, P (2016) Fabrication of RNA 3D Nanoprisms for Loading and Protection of Small RNAs and Model Drugs. *Adv Mater* **28**(45):10079-10087. PMID5224701.
- Erasmus, JH, Auguste, AJ, Kaelber, JT, Luo, H, Rossi, SL, Fenton, K, Leal, G, Kim, DY, Chiu, W, Wang, T, Frolov, I, Nasar, F, & Weaver, SC (2017) A chikungunya fever vaccine utilizing an insect-specific virus platform. *Nat Med* **23**(2):192-199. PMID5296253.
- Murata, K, Zhang, Q, Gerardo Galaz-Montoya, J, Fu, C, Coleman, ML, Osburne, MS, Schmid, MF, Sullivan, MB, Chisholm, SW, & Chiu, W (2017) Visualizing Adsorption of Cyanophage P-SSP7 onto Marine Prochlorococcus. *Sci Rep* **7**:44176. PMID5345008.
- Luengo, I, Darrow, MC, Spink, MC, Sun, Y, Dai, W, He, CY, Chiu, W, Pridmore, T, Ashton, AW, Duke, EMH, Basham, M, & French, AP (2017) SuRVoS: Super-Region Volume Segmentation workbench. *J Struct Biol* **198**(1):43-53. PMID5405849.
- Kaelber, JT, Hryc, CF, & Chiu, W (2017) Electron Cryomicroscopy of Viruses at Near-Atomic Resolutions. *Annu Rev Virol* **10**.1146/annurev-virology-101416-041921. PMID
- Hryc, CF, Chen, DH, Afonine, PV, Jakana, J, Wang, Z, Haase-Pettingell, C, Jiang, W, Adams, PD, King, JA, Schmid, MF, & Chiu, W (2017) Accurate model annotation of a near-atomic resolution cryo-EM map. *Proc Natl Acad Sci U S A* **114**:3103-3108. PMID 5373346.

- Wang, Z, Fan, G, Hryc, CF, Blaza, JN, Serysheva, II, Schmid, MF, Chiu, W, Luisi, BF, & Du, D (2017) An allosteric transport mechanism for the AcrAB-TolC Multidrug Efflux Pump. *Elife* **6**. PMID5404916
- Roh, SH, Hryc, CF, Jeong, HH, Fei, X, Jakana, J, Lorimer, GH, & Chiu, W (2017) Subunit conformational variation within individual GroEL oligomers resolved by Cryo-EM. *Proc Natl Acad Sci U S A* **114**(31):8259-8264. PMID5547627.
- Yi, P, Wang, Z, Feng, Q, Chou, CK, Pintilie, GD, Shen, H, Foulds, CE, Fan, G, Serysheva, I, Ludtke, SJ, Schmid, MF, Hung, MC, Chiu, W, & O'Malley, BW (2017) Structural and Functional Impacts of ER Coactivator Sequential Recruitment. *Mol Cell* **67**(5):733-743 e734. PMID5657569.
- Chiu, W & Downing, KH (2017) Editorial overview: Cryo Electron Microscopy: Exciting advances in CryoEM Herald a new era in structural biology. *Curr Opin Struct Biol* **46**:iv-viii. PMID5683930.
- Chen, M, Dai, W, Sun, SY, Jonasch, D, He, CY, Schmid, MF, Chiu, W, & Ludtke, SJ (2017) Convolutional neural networks for automated annotation of cellular cryo-electron tomograms. *Nat Methods* **14**(10):983-985. PMID5623144.
- Lan, X, Su, Z, Zhou, Y, Meyer, T, Ke, Y, Wang, Q, Chiu, W, Liu, N, Zou, S, Yan, H, & Liu, Y (2017) Programmable Supra-Assembly of a DNA Surface Adapter for Tunable Chiral Directional Self-Assembly of Gold Nanorods. *Angew Chem Int Ed Engl* **56**(46):14632-14636.
- Wang, Q, Irobalieva, RN, Chiu, W, Schmid, MF, Fogg, JM, Zechiedrich, L, & Pettitt, BM (2017) Influence of DNA sequence on the structure of minicircles under torsional stress. *Nucleic Acids Res* **45**(13):7633-7642. PMID5737869.
- Erasmus, JH, Seymour, RL, Kaelber, JT, Kim, DY, Leal, G, Sherman, MB, Frolov, I, Chiu, W, Weaver, SC, & Nasar, F (2018) Novel Insect-Specific Eilat Virus-Based Chimeric Vaccine Candidates Provide Durable, Mono- and Multivalent, Single-Dose Protection against Lethal Alphavirus Challenge. *J Virol* **92**(4). PMID5790933.
- Du, D, Wang, Z, Chiu, W, & Luisi, BF (2018) Purification of AcrAB-TolC Multidrug Efflux Pump for Cryo-EM Analysis. *Methods Mol Biol* **1700**:71-81. PMID
- Su, Z, Wu, C, Shi, L, Luthra, P, Pintilie, GD, Johnson, B, Porter, JR, Ge, P, Chen, M, Liu, G, Frederick, TE, Binning, JM, Bowman, GR, Zhou, ZH, Basler, CF, Gross, ML, Leung, DW, Chiu, W, & Amarasinghe, GK (2018) Electron Cryo-microscopy Structure of Ebola Virus Nucleoprotein Reveals a Mechanism for Nucleocapsid-like Assembly. *Cell* **172**(5):966-978 e912. PMID
- Zhang, K, Keane, SC, Su, Z, Irobalieva, RN, Chen, M, Van, V, Sciandra, CA, Marchant, J, Heng, X, Schmid, MF, Case, DA, Ludtke, SJ, Summers, MF, & Chiu, W (2018) Structure of the 30 kDa HIV-1 RNA Dimerization Signal by a Hybrid Cryo-EM, NMR, and Molecular Dynamics Approach. *Structure* **26**(3):490-498 e493. PMID5842133.
- Roh, SH, Stam, NJ, Hryc, CF, Couoh-Cardel, S, Pintilie, G, Chiu, W, & Wilkens, S (2018) The 3.5-A CryoEM Structure of Nanodisc-Reconstituted Yeast Vacuolar ATPase Vo Proton Channel. *Mol Cell* 10.1016/j.molcel.2018.02.006.

<http://www.ncbi.nlm.nih.gov/myncbi/browse/collection/40686144/?sort=date&direction=descending>

<https://www.ncbi.nlm.nih.gov/pubmed/?term=Chiu%2C+Wah>