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EDUCATION

2005-2011 **UNIVERSITY OF CALIFORNIA, SAN FRANCISCO**
Ph.D. Cell Biology

1999 -2003 **UNIVERSITY OF CALIFORNIA, BERKELEY**
B.A. Molecular and Cell Biology

RESEARCH AND PROFESSIONAL EXPERIENCE

2020-present **Junior Fellow**, Technical University of Munich
2019-present **Principal Investigator**, Helmholtz Pioneer Campus
We are using focused ion beam milling and cryo-electron tomography to study the in situ structural biology of macromolecules within native-state frozen cellular environments.

2011-2019 **Postdoc**, Wolfgang Baumeister, MPI of Biochemistry
Project Group Leader 2016-2019

2010 **Visiting Scientist**, Ritsu Kamiya, University of Tokyo
I used electron microscopy to study the structure of cilia.

2005-2011 **Graduate Student**, Wallace Marshall, UC San Francisco
I studied the relationship between intraflagellar transport and flagellar length control.

2001-2005 **Research Associate**, Carolyn Larabell, Lawrence Berkeley National Laboratory
I studied cellular defense mechanisms during the early stages of breast cancer metastasis.

1998-2001 **Student Intern**, Advanced Light Source, Lawrence Berkeley National Laboratory

FUNDING AND AWARDS

2017-2020 **DFG Grant FOR2092: Biogenesis of Thylakoid Membranes**, MPI of Biochemistry

2015 **Junior Research Award**, MPI of Biochemistry

2011-2013 **Alexander von Humboldt Foundation Research Fellowship**, MPI of Biochemistry

2010 **NSF East Asia and Pacific Summer Institutes (EAPSI) Fellowship**, University of Tokyo

2008-2009 **Genentech Graduate Fellowship**, UC San Francisco

2003 **Departmental Honors**, Molecular and Cell Biology, UC Berkeley

MENTORING AND TEACHING

2014-present **Supervisor**, 3 postdocs, 5 graduate students (<https://www.cellarchlab.com/people.html>)

Feb 2020 **Instructor**, Vienna BioCenter Cryo-EM Winter School; Vienna, Austria

May 2019 **Instructor**, Advanced Workshop on Cryo-Electron Tomography; Vienna, Austria

2005-2009 **Research Mentor and Classroom Teacher**, UCSF Science and Education Partnership

INVITED TALKS

Jun 2020 Virtual Seminar; DKFZ-ZMBH Alliance Colloquium; Heidelberg, Germany

Feb 2020 MPI of Biophysical Chemistry guest lecture; Göttingen, Germany

Jan 2020 3D Electron Microscopy of Organelles and Macromolecules, CUHK; Hong Kong, China

Dec 2019 Plenary talk; Christmas Bioenergetics Meeting; London, United Kingdom

Oct 2019 Institut Curie seminar series; Paris, France

Oct 2019 MRC Laboratory of Molecular Biology guest lecture; Cambridge, United Kingdom
Jul 2019 SFB924 Colloquium; Freising, Germany
Jun 2019 Vrije Universiteit guest lecture; Amsterdam, the Netherlands
May 2019 Université Libre de Bruxelles guest lecture; Brussels, Belgium
Apr 2019 BiteSizeBio Webinar: Cryo-electron Tomography for Cell Biology
<https://bitesizebio.com/webinar/cryo-electron-tomography-for-cell-biology/>
Mar 2019 Life Sciences Institute seminar series; Ann Arbor, MI, USA
Nov 2018 University of Vienna MFPL guest lecture; Vienna, Austria
Nov 2018 CNRS Aviesan meeting on How Cryo-EM meets Chemical Structure; Paris, France
Oct 2018 International Conference on Physics and Biological Systems; Gif-sur-Yvette, France
Oct 2018 Keynote speaker; Ohio State Cryo-EM for Cancer workshop, Columbus, OH, USA
Sep 2018 Molecular Horizons seminar; Wollongong, Australia
Sep 2018 International Microscopy Congress; Sydney, Australia
Sep 2018 NTU guest lecture; Singapore
Aug 2018 ETH guest lecture; Zurich, Switzerland
Aug 2018 Keynote speaker; ETH/PSI/Univ. Zurich BSM grad student retreat; Morschach, Switzerland
Jun 2018 International Chlamydomonas Conference; Washington, DC, USA
Jun 2018 Princeton special seminar; Princeton, NJ, USA
Jun 2018 Gordon Research Conference on 3D Electron Microscopy; Newport, RI, USA
May 2018 MPI for Terrestrial Microbiology guest lecture; Marburg, Germany
Jan 2018 UCLA-DOE Institute guest lecture; Los Angeles, CA, USA
Jan 2018 Western Photosynthesis Conference; Oracle, AZ, USA
Nov 2017 CEA guest lecture; Grenoble, France
Aug 2017 German/Austrian/Swiss Microscopy Conference; Lausanne, Switzerland
Jul 2017 Gordon Research Conference on Photosynthesis; Newry, MN, USA
Jul 2017 French Society of Microscopy; Bordeaux, France
Jun 2017 Symposium on Chloroplast Metabolism and Photosynthesis; Neuchâtel, Switzerland
Jun 2017 French Photosynthesis Society; Paris, France
Mar 2017 SFB 1208 Retreat; Schleiden, Germany
Nov 2016 University of Jena botanical colloquium; Jena, Germany
Oct 2016 Nordic Photosynthesis Congress; Copenhagen, Denmark
Aug 2016 International Congress of Photosynthesis; Maastricht, the Netherlands
Jun 2016 International Chlamydomonas Conference; Kyoto, Japan
Mar 2016 Michigan State Plant Research Laboratory seminar series; Lansing, MI, USA
Dec 2015 American Society for Cell Biology minisymposium; San Diego, CA, USA
Oct 2015 University of Sheffield molecular biology seminar series; Sheffield, United Kingdom
Jul 2015 Gordon Research Conference on Photosynthesis; Waltham, MA, USA

PUBLICATIONS *indicates corresponding author (<https://www.cellarchlab.com/publications.html>)

Kumar Gupta T, Klumpe S, Gries K, Heinz S, Wietrzynski W, Ohnishi N, Niemeyer J, Schaffer M, Rast A, Strauss M, Plitzko JM, Baumeister W, Rudack T, Sakamoto W, Nickelsen J*, Schuller JM*, Schroda M*, **Engel BD*** (2020). Structural basis for VIPP1 oligomerization and maintenance of thylakoid membrane integrity. *bioRxiv*. 2020.08.11.243204.

Klena N, Le Guennec M, Tassin A-M, *van den Hoek H*, Erdmann PS, Schaffer M, Geimer S, Kovacic L, Goldie KN, Stahlberg H, **Engel BD***, Hamel V, Guichard P (2020). Probing the evolutionary conservation of the centriole cartwheel-containing region by cryo-electron tomography. *EMBO Journal*. [in press]

He S, Chou H-T, Matthies D, Wunder T, Meyer MT, Atkinson N, Martinez-Sanchez A, Jeffrey PD, Port SA, Patena W, He G, Chen VK, Hughson FM, McCormick SJ, Mueller-Cajar O, **Engel BD**, Yu Z, Jonikas MC (2020). The structural basis of Rubisco phase separation in the pyrenoid. *Nature Plants*. [in press]

Wietrzynski W, Schaffer M, Tegunov D, Albert S, Kanazawa A, Plitzko JM, Baumeister W, **Engel BD*** (2020). Charting the native architecture of Chlamydomonas thylakoid membranes with single-molecule precision. *eLife*. 9: e53740.

Le Guennec M, Klena N, Gambarotto D, Laporte MH, Tassin AM, *van den Hoek H*, Erdmann PS, Schaffer M, Kovacic L, Borgers S, Goldie KN, Stahlberg H, Bornens M, Azimzadeh J, **Engel BD***, Hamel V, Guichard P (2020). A helical inner scaffold provides a structural basis for centriole cohesion. *Science Advances*. 6: eaaz4137.

Theis J, Niemeyer J, Schmollinger S, Ries F, Rütgers M, Gupta TK, Sommer F, Muranaka LS, Venn B, Schulz-Raffelt M, Willmund F, **Engel BD**, Schroda M (2020). VIPP2 interacts with VIPP1 and HSP22E/F at chloroplast membranes and modulates a retrograde signal for HSP22E/F gene expression. *Plant, Cell & Environment*. 43: 1212-1229.

Albert S, Wietrzynski W, Lee CW, Schaffer M, Beck F, Schuller JM, Salomé PA, Plitzko JM, Baumeister W, **Engel BD*** (2020). Direct visualization of degradation microcompartments at the ER membrane. *Proceedings of the National Academy of Sciences USA*. 117:1069-1080.

Craig EW, Mueller DM, Bigge BM, Schaffer M, **Engel BD**, Avasthi P* (2019). The elusive actin cytoskeleton of a green alga expressing both conventional and divergent actins. *Molecular Biology of the Cell*. 30: 2827-2837.

Schaffer M, Pfeffer S, Mahamid J, Kleindiek S, Laugks T, Albert S, **Engel BD**, Rummel A, Smith AJ, Baumeister W, Plitzko JM (2019). A cryo-FIB lift-out technique enables molecular-resolution cryo-ET within native *Caenorhabditis elegans* tissue. *Nature Methods*. 16: 757-762.

Theis J, Kumar Gupta T, Klingler J, Wan W, Albert S, Keller S, **Engel BD***, Schroda M (2019). VIPP1 rods engulf membranes containing phosphatidylinositol phosphates. *Scientific Reports*. 9: 8725.

Rast A, Schaffer M, Albert S, Wan W, Pfeffer S, Beck F, Plitzko JM, Nickelsen J, **Engel BD*** (2019). Biogenic regions of cyanobacterial thylakoids form contact sites with the plasma membrane. *Nature Plants*. 5: 436-446.

Chicano A, Crosas E, Otón J, Melero R, **Engel BD**, Daban JR (2019). Frozen-hydrated chromatin from metaphase chromosomes has an interdigitated multilayer structure. *The EMBO Journal*. 38: e99769.

Schuller JM, Birrell JA, Tanaka H, Konuma T, Wulfhorst H, Cox N, Schuller SK, Thiemann J, Lubitz W, Sétif P, Ikegami T, **Engel BD**, Kurisu G, Nowaczyk MM (2019). Structural adaptations of photosynthetic complex I enable ferredoxin-dependent electron transfer. *Science*. 363:257-260.

Kovtun O, Leneva N, Bykov YS, Ariotti N, Teasdale RD, Schaffer M, **Engel BD**, Owen DJ, Briggs JAB, Collins BM (2018). Structure of the membrane-assembled retromer coat by cryo-electron tomography. *Nature*. 561: 561-564.

Delarue M, Brittingham GP, Pfeffer S, Surovtsev IV, Pinglay S, Kennedy KJ, Schaffer M, Gutierrez JI, Sang D, Poterewicz G, Chung JK, Plitzko JM, Groves JT, Jacobs-Wagner C, **Engel BD***, Holt LJ (2018). mTORC1 controls phase separation and the biophysical properties of the cytoplasm by tuning crowding. *Cell*. 174: 338-349.e320.

Mosalaganti S, Kosinski J, Albert S, Schaffer M, Strenkert D, Salomé PA, Merchant SS, Plitzko JM, Baumeister W, **Engel BD***, Beck M (2018). In situ architecture of the algal nuclear pore complex. *Nature Communications*. 9: 2361.

Albert S, Schaffer M, Beck F, Mosalaganti S, Asano S, Thomas HF, Plitzko JM, Beck M, Baumeister W, **Engel BD*** (2017). Proteasomes tether to two distinct sites at the nuclear pore complex. *Proceedings of the National Academy of Sciences USA*. 114: 13726-13731.

Bykov YS, Schaffer M, Dodonova SO, Albert S, Plitzko JM, Baumeister W, **Engel BD***, Briggs JAG (2017). The structure of the COPI coat determined within the cell. *eLife*. 6: e32493.

Freeman Rosenzweig ES, Xu B, Kuhn Cuellar L, Martinez-Sanchez A, Schaffer M, Strauss M, Cartwright HN, Ronceray P, Plitzko JM, Förster F, Wingreen NS, **Engel BD***, Mackinder LCM, Jonikas MC (2017). The Eukaryotic CO₂-Concentrating Organelle Is Liquid-like and Exhibits Dynamic Reorganization. *Cell*. 171: 148-162.e19.

Albanese P, Melero R, **Engel BD**, Grinzato A, Berto P, Manfredi M, Chiodoni A, Vargas J, Sorzano CÓS, Marengo E, Saracco G, Zanotti G, Carazo JM, Pagliano C (2017). Pea PSII-LHCII supercomplexes form pairs by making connections across the stromal gap. *Scientific Reports*. 7: 10067.

Pfeffer S, Dudek J, Schaffer M, Ng BG, Albert S, Plitzko JM, Baumeister W, Zimmermann R, Freeze HH, **Engel BD***, Förster F (2017). Dissecting the molecular organization of the translocon-associated protein complex. *Nature Communications*. 8: 14516.

Schaffer M, Mahamid J, **Engel BD**, Laugks T, Baumeister W, Plitzko J (2017). Optimized cryo-focused ion beam sample preparation aimed at in situ structural studies of membrane proteins. *Journal of Structural Biology*. 197: 73-82.

Asano S, **Engel BD**, Baumeister W (2016). In situ cryo-electron tomography: a post-reductionist approach to structural biology. *Journal of Molecular Biology*. 428: 332-343.

Engel BD*, Schaffer M, Albert S, Asano S, Plitzko JM, Baumeister W (2015). In situ structural analysis of Golgi intracisternal protein arrays. *Proceedings of the National Academy of Sciences USA*. 112: 11264-11269.

Schaffer M, **Engel BD**, Laugks T, Mahamid J, Plitzko JM, Baumeister W (2015). Cryo-focused ion beam sample preparation for imaging vitreous cells by cryo-electron tomography. *Bio-protocol*. 5: e1575.

Engel BD*, Schaffer M, Cuellar LK, Villa E, Plitzko JM, Baumeister W (2015). Native architecture of the Chlamydomonas chloroplast revealed by in situ cryo-electron tomography. *eLife*. 4: e04889.

Bhogaraju S, Weber K, **Engel BD**, Lehtreck KF, Lorentzen E (2014). Getting tubulin to the tip of the cilium: one IFT train, many different tubulin cargo-binding sites? *Bioessays*. 36: 463-467.

Bhogaraju S, **Engel BD**, Lorentzen E (2013). Intraflagellar transport complex structure and cargo interactions. *Cilia*. 2: 10.

Shih SM, **Engel BD**, Kocabas F, Bilyard T, Gennerich A, Marshall WF, Yildiz A (2013). Intraflagellar transport drives flagellar surface motility. *eLife*. 2: e00744.

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Mizuno N, Taschner M, **Engel BD**, Lorentzen E (2012). Structural studies of ciliary components. *Journal of Molecular Biology*. 422: 163-180.

Engel BD, Ishikawa H, Feldman JL, Wilson CW, Chuang PT, Snedecor J, Williams J, Sun Z, Marshall WF (2011). A cell-based screen for inhibitors of flagella-driven motility in Chlamydomonas reveals a novel modulator of ciliary length and retrograde actin flow. *Cytoskeleton*. 68: 188-203.

Engel BD, Ludington WB, Marshall WF (2009). Intraflagellar transport particle size scales inversely with flagellar length: revisiting the balance-point length control model. *The Journal of Cell Biology*. 187: 81-89.

Engel BD, Lehtreck KF, Sakai T, Ikebe M, Witman GB, Marshall WF (2009). Total internal reflection fluorescence (TIRF) microscopy of Chlamydomonas flagella. *Methods in Cell Biology*. 93: 155-176.

REFERENCES

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