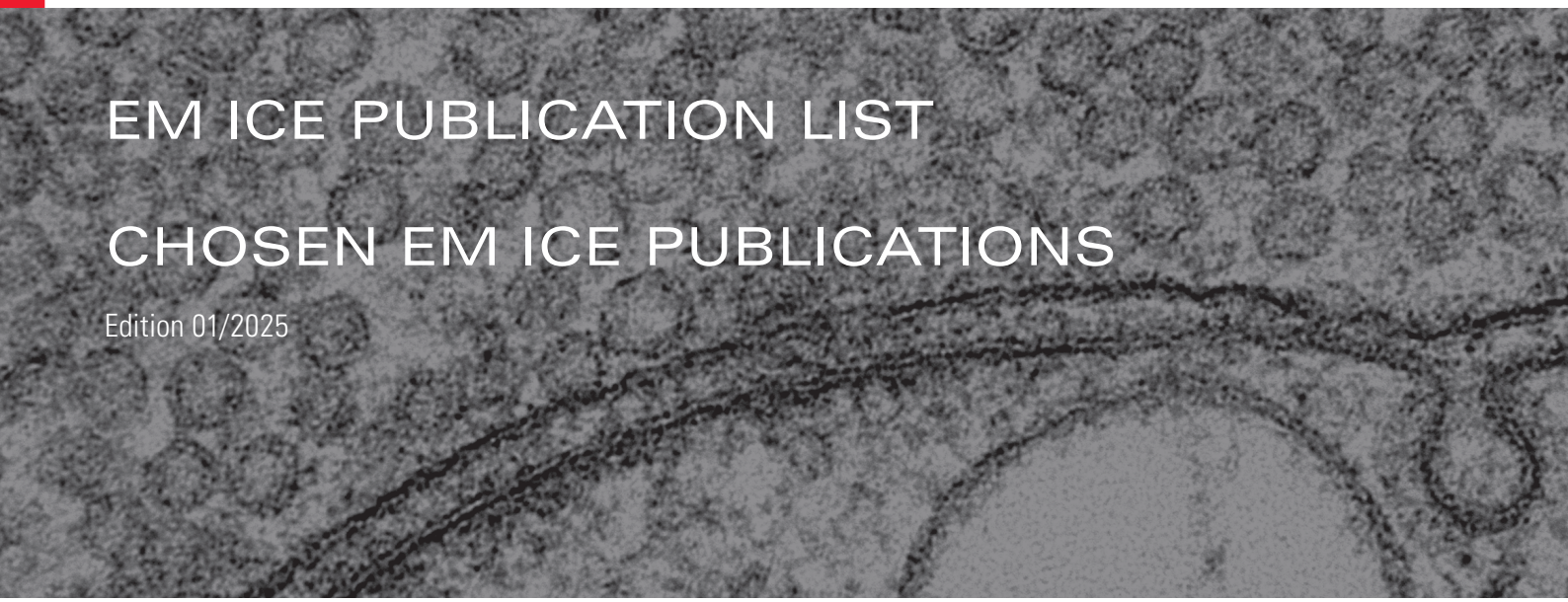
From Eye to Insight

Leica MICROSYSTEMS

EM ICE PUBLICATION LIST

CHOSEN EM ICE PUBLICATIONS

Edition 01/2025



Symmetric synapse. Dr. Shuwen Chang, Charité Universitätsmedizin, Berlin, Germany

VITRIFY FOR DEEPER UNDERSTANDING

Versatile freezing and experimentation platform for EM Sample Preparation.

This list presents recent publications in the main application areas of high pressure freezing with the EM ICE and is updated regularly.

High-pressure freezing (HPF) is a cryopreservation technique in which samples are rapidly vitrified by being subjected to high pressure before freezing. This method minimizes ice crystal formation, preserving the ultrastructure of cells and tissues in their native state and is widely used in electron microscopy to prepare samples for room temperature and cryo imaging. HPF can be used to prepare a broad variety of samples, from proteins and macromolecular complexes, tissues, microorganisms, and cell cultures to polymers, and new materials undergoing structural and functional analysis.

Contents

Waffle method

1. **Serial Lift-Out: sampling the molecular anatomy of whole organisms.** Oda Helene Schiøtz, Christoph J. O. Kaiser, Sven Klumpe, Dustin R. Morado, Matthias Poege, Jonathan Schneider, Florian Beck, David P. Klebl, Christopher Thompson & Jürgen M. Plitzko. Nature Methods (2023).
   https://doi.org/10.1038/s41592-023-02113-5
   EM ICE, Leica TCS SP8, CMK, EM UC6, EM FC6

2. **Cryo-electron tomographic investigation of native hippocampal glutamatergic synapses.** Aya Matsui, Cathy Spangler, Johannes Elferich, Momoko Shiozak, iNikki Jean, Xiaowei Zhao, Maozhen Qin, Haining Zhong, Zhiheng Yu, Eric Gouaux. eLife (2024).
   https://doi.org/10.7554/eLife.98458.3
   EM ICE

3. **Xenon plasma focused ion beam lamella fabrication on high pressure frozen specimens for structural cell biology.** Casper Berger, Helena Watson, James Naismith, Maud Dumoux, Michael Grange. bioRxiv (2024).
   https://doi.org/10.1101/2024.06.20.599830
   EM ICE

Cryo-liftout

1. **Serialized on-grid lift-in sectioning for tomography (SOLIST) enables a biopsy at the nanoscale.** Ho Thuy Dung Nguyen, Gaia Perone, Nikolai Klena, Roberta Vazzana, Flaminia Kaluthantrige Don, Malan Silva, Simona Sorrentino, Paolo Swuec, Frederic Leroux, Nereo Kalebic, Francesca Coscia & Philipp S. Erdmann. Nature Methods (2024).
   https://doi.org/10.1038/s41592-024-02384-6
   EM ICE, THUNDER Imager EM Cryo CLEM, EM UC7, EM FC7

2. **CryoET of β-amyloid and tau within postmortem Alzheimer's disease brain.** Madeleine A. G. Gilbert, Nayab Fatima, Joshua Jenkins, Thomas J. O'Sullivan, Andreas Schertel, Yehuda Halfon, Martin Wilkinson, Tjado H. J. Morrema, Mirjam Geibel, Randy J. Read, Neil A. Ranson, Sheena E. Radford, Jeroen J. M. Hoozemans & René A. W. Frank. Nature (2024).
   https://doi.org/10.1038/s41586-024-07680-x
   EM ICE, THUNDER Imager EM Cryo CLEM, EM UC7, EM FC7

3. **The in-tissue molecular architecture of β-amyloid pathology in the mammalian brain.** Conny Leistner, Martin Wilkinson, Ailidh Burgess, Megan Lovatt, Stanley Goodbody, Yong Xu, Susan Deuchars, Sheena E. Radford, Neil A. Ranson & René A. W. Frank. Nature Communications (2023).
   https://doi.org/10.1038/s41467-023-38495-5
   EM ICE, THUNDER Imager EM Cryo CLEM, EM UC7, EM FC7

Freeze fracture

1. **Thylakoid membrane stacking controls electron transport mode during the dark-to-light transition by adjusting the distances between PSI and PSII.** Yuval Garty, Yuval Bussi, Smadar Levin-Zaidman, Eyal Shimoni, Helmut Kirchhoff, Dana Charuvi, Reinat Nevo & Ziv Reich. Nature Plants (2024).
   https://doi.org/10.1038/s41477-024-01628-9
   EM ICE, EM VCT100

2. **Decoupling rheology from particle concentration by charge modulation: Aqueous graphene-clay dispersions.** Lucas Luciano Cullari, Gal Yosefi, Einat Nativ-Roth, István Furó, Oren Regev. Journal of Colloid and Interface Science (2024).
   https://doi.org/10.1016/j.jcis.2023.11.047
   EM ICE, EM VCM, EM VCT500, EM ACE900

3. **A self-healing multispectral transparent adhesive peptide glass.** Gal Finkelstein-Zuta, Zohar A. Arnon, Thangavel Vijayakanth, Or Messer, Orr Simon Lusky, Avital Wagner, Galit Zilberman, Ruth Aizen, Lior Michaeli, Sigal Rencus-Lazar, Sharon Gilead, Sudha Shankar, Mariela Jorgelina Pavan, Dor Aaron Goldstein, Shira Kutchinsky, Tal Ellenbogen, Benjamin A. Palmer, Amir Goldbourt, Maxim Sokol & Ehud Gazit. Nature (2024).
   https://doi.org/10.1038/s41586-024-07408-x
   EM ICE, EM VCM, EM VCT500, EM ACE900

4. **Capsule Formation Mechanisms in Interfacially Initiated Macroporous Hydrogels to Tailor Microstructures for the Encapsulation of Living Bacteria.** Albert P. Woodward-Rowe, Jean-Yves Mugnier, Giovambattista Depietra, Benjamin Holt, Solomon S. Melides, Annette Christie, Rosa Dominguez-Espinosa, Suzanne M. Hingley-Wilson, Joseph L. Keddie. ACS Applied Polymer Materials (2024).
   https://doi.org/10.1021/acsapm.4c02458
   EM ICE

5. **Brilliant whiteness in shrimp from ultra-thin layers of birefringent nanospheres.** Tali Lemcoff, Lotem Alus, Johannes S. Haataja, Avital Wagner, Gan Zhang, Mariela J. Pavan, Venkata Jayasurya Yallapragada, Silvia Vignolini, Dan Oron, Lukas Schertel & Benjamin A. Palmer. Nature Photonics (2023).
https://doi.org/10.1038/s41566-023-01182-4
EM ICE, EM VCM, EM VCT500, EM ACE900

6. **Toward Tunable Protein-Driven Hydrogel Lens.** Maria Kaeek, Luai R. Khoury. Advanced Science (2023).
https://doi.org/10.1002/advs.202306862
EM ICE, EM VCM, EM VCT500, EM ACE900

7. **Micro and nano-scale compartments guide the structural transition of silk protein monomers into silk fibers.** D. Eliaz, S. Paul, D. Benyamin, A. Cernescu, S. R. Cohen, I. Rosenhek-Goldian, O. Brookstein, M. E. Miali, A. Solomonov, M. Greenblatt, Y. Levy, U. Raviv, A. Barth & U. Shimanovich. Nature Communications (2022).
https://doi.org/10.1038/s41467-022-35505-w
EM ICE, EM VCT100

Electrical stimulation

1. **Ultrastructural Imaging of Activity-Dependent Synaptic Membrane-Trafficking Events in Cultured Brain Slices.** Cordelia Imig, Francisco José López-Murcia, Lydia Maus, Inés Hojas García-Plaza, Lena Sünke Mortensen, Manuela Schwark, Valentin Schwarze, Julie Angibaud, U. Valentin Nägerl. Holger Taschenberger, Nils Brose, Benjamin H. Cooper. Neuroresource (2020).
https://doi.org/10.1016/j.neuron.2020.09.004
EM ICE, EM AFS2, EM UC7, EM ACE600

2. **Synaptic vesicles transiently dock to refill release sites.** Grant F. Kusick, Morven Chin, Sumana Raychaudhuri, Kristina Lippmann, Kadidia P. Adula, Edward J. Hujber, Thien Vu, M. Wayne Davis, Erik M. Jorgensen & Shigeki Watanabe. Nature Neuroscience (2020).
https://doi.org/10.1038/s41593-020-00716-1
EM ICE, EM AFS2, EM UC7

3. **Synaptotagmin 7 is targeted to the axonal plasma membrane through γ-secretase processing to promote synaptic vesicle docking in mouse hippocampal neurons.** Jason D Vevea, Grant F Kusick, Kevin C Courtney, Erin Chen, Shigeki Watanabe, Edwin R Chapman. eLife (2021).
https://doi.org/10.7554/eLife.67261
EM ICE, EM AFS2, EM UC7

4. **Different effects of cardiomyocyte contractile activity on transverse and axial tubular system luminal content dynamics.** J. Greiner, M. Dente, S. Orós-Rodrigo, B.A. Cameron, J. Madl, W. Kaltenbacher, T. Kok, C.M. Zgierski-Johnston, R. Peyronnet, P. Kohl, L. Sacconi, E.A. Rog-Zielinska. Journal of Molecular and Cellular Cardiology (2024).
https://doi.org/10.1016/j.yjmcc.2024.10.014
EM ICE, EM AFS2

5. **Beat-by-Beat Cardiomyocyte T-Tubule Deformation Drives Tubular Content Exchange.** Eva A. Rog-Zielinska, Marina Scardigli, Remi Peyronnet, Callum M. Zgierski-Johnston, Joachim Greiner, Josef Madl, Eileen T. O'Toole, Mary Morphew, Andreas Hoenger, Leonardo Sacconi, Peter Kohl. Circulation Research (2020).
https://doi.org/10.1161/CIRCRESAHA.120.31726
EM ICE, EM AFS2

6. **Asynchronous release sites align with NMDA receptors in mouse hippocampal synapses.** Shuo Li, Sumana Raychaudhuri, Stephen Alexander Lee, Marisa M. Brockmann, Jing Wang, Grant Kusick, Christine Prater, Sarah Syed, Hanieh Falahati, Raul Ramos, Tomas M. Bartol, Eric Hosy & Shigeki Watanabe. Nature Communications (2021).
https://doi.org/10.1038/s41467-021-21004-x
EM ICE, EM AFS2, EM UC7

CLEM

1. **Cone-shaped HIV-1 capsids are transported through intact nuclear pores.** Vojtech Zila, Erica Margiotta, Beata Turoňová, Thorsten G. Müller, Christian E. Zimmerli, Simone Mattei, Matteo Allegretti, Kathleen Börner, Jona Rada, Barbara Müller, Marina Lusic, Hans-Georg Kräusslich, and Martin Beck. Cell (2021).
https://doi.org/10.1016/j.cell.2021.01.025
EM ICE, EM GP2, EM AFS2, EM UC7

2. **Clostridium perfringens virulence factors are nonredundant activators of the NLRP3 inflammasome.** Anukriti Mathur, Callum Kay, Yansong Xue, Abhimanu Pandey, Jiwon Lee, Weidong Jing, Daniel Enosi Tuipulotu, Jordan Lo Pilato, Shouya Feng, Chinh Ngo, Anyang Zhao, Cheng Shen, Melanie Rug, Lisa A Miosge, Ines I Atmosukarto, Jason D Price, Sidra A Ali, Elizabeth E Gardiner, Avril AB Robertson, Milena M Awad, Dena Lyras, Nadeem O Kaakoush, and Si Ming Man. EMBO reports (2023).
https://doi.org/10.15252/embr.202254600
EM ICE, EM AFS2, EM UC7

3. **A WDR35-dependent coat protein complex transports ciliary membrane cargo vesicles to cilia.** Tooba Quidwai, Jiaolong Wang, Emma A Hall, Narcis A Petriman, Weihua Leng, Petra Kiesel, Jonathan N Wells, Laura C Murphy, Margaret A Keighren, Joseph A Marsh, Esben Lorentzen, Gaia Pigino, Pleasantine Mill. eLife (2021).
https://doi.org/10.7554/eLife.69786
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4. **High-resolution characterization of centriole distal appendage morphology and dynamics by correlative STORM and electron microscopy.** Mathew Bowler, Dong Kong, Shufeng Sun, Rashmi Nanjundappa, Lauren Evans, Veronica Farmer, Andrew Holland, Moe R. Mahjoub, Haixin Sui & Jadranka Loncarek. Nature Communications (2019).
https://doi.org/10.1038/s41467-018-08216-4
EM ICE

5. **PDZD8 interacts with Protrudin and Rab7 at ER-late endosome membrane contact sites associated with mitochondria.** Yael Elbaz-Alon, Yuting Guo, Nadav Segev, Michal Harel, Daniel E. Quinnell, Tamar Geiger, Ori Avinoam, Dong Li & Jodi Nunnari. Nature Communications (2020).
https://doi.org/10.1038/s41467-020-17451-7
EM ICE, EM AFS2, EM UC7

6. **Loss of the HOPS complex disrupts early-to-late endosome transition, impairs endosomal recycling and induces accumulation of amphisomes.** Jan van der Beek, Cecilia de Heus, Paolo Sanza, Nalan Liv, and Judith Klumperman. Molecular Biology of the Cell (2024).
https://doi.org/10.1091/mbc.E23-08-0328
EM ICE, EM UC7, EM AC20

7. **The endoplasmic reticulum connects to the nucleus by constricted junctions that mature after mitosis.** Helena Bragulat-Teixidor, Keisuke Ishihara, Gréta Martina Szücs and Shotaro Otsuka. EMBO Reports (2024).
https://doi.org/10.1038/s44319-024-00175-w
EM ICE, THUNDER Imager Nano, EM AFS2

Volume EM/Array Tomography

1. **A versatile enhanced freeze-substitution protocol for volume electron microscopy.** Sébastien Bélanger, Heather Berensmann, Valentina Baena, Keith Duncan, Blake C. Meyers, Kedar Narayan, Kirk J. Czymmek. Frontiers in Cell and Developmental Biology (2022).
https://doi.org/10.3389/fcell.2022.933376
EM ICE, EM AFS2

2. **Targeted volume correlative light and electron microscopy of an environmental marine microorganism.** Karel Mocaer, Giulia Mizzon, Manuel Gunkel, Aliaksandr Halavatyi, Anna Steyer, Viola Oorschot, Martin Schorb, Charlotte Le Kieffre, Daniel P. Yee, Fabien Chevalier, Benoit Gallet, Johan Decelle, Yannick Schwab, Paolo Ronchi. Journal of Cell Science (2023).
https://doi.org/10.1242/jcs.261355
EM ICE, EM AFS2

3. **Charting the landscape of cytoskeletal diversity in microbial eukaryotes.** Felix Mikus, Armando Rubio Ramos, Hiral Shah, Marine Olivetta, Susanne Borgers, Jonas Hellgoth, Clémence Saint-Donat, Margarida Araújo, Chandni Bhickta, Paulina Cherek, Jone Bilbao, Estibalitz Txurruka, Nikolaus Leisch, Yannick Schwab, Filip Husnik, Sergio Seoane, Ian Probert, Paul Guichard, Virginie Hamel, Gautam Dey, Omaya Dudin. bioRxiv (2024).
https://doi.org/10.1101/2024.10.18.618984
EM ICE, EM AFS

4. **Deep neural network automated segmentation of cellular structures in volume electron microscopy.** Benjamin Gallusser, Giorgio Maltese, Giuseppe Di Caprio, Tegy John Vadakkan, Anwesha Sanyal, Elliott Somerville, Mihir Sahasrabudhe, Justin O'Connor, Martin Weigert, Tom Kirchhausen. Journal of Cell Biology (2023). https://doi.org/10.1083/jcb.202208005
EM ICE, EM AFS2

5. **An open-access volume electron microscopy atlas of whole cells and tissues.** C. Shan Xu, Song Pang, Gleb Shtengel, Andreas Müller, Alex T. Ritter, Huxley K. Hoffman, Shin-ya Takemura, Zhiyuan Lu, H. Amalia Pasolli, Nirmala Iyer, Jeeyun Chung, Davis Bennett, Aubrey V. Weigel, Melanie Freeman, Schuyler B. van Engelenburg, Tobias C. Walther, Robert V. Farese Jr., Jennifer Lippincott-Schwartz, Ira Mellman, Michele Solimena & Harald F. Hess. Nature (2021). https://doi.org/10.1038/s41586-021-03992-4
EM ICE, EM AFS2

6. An optimized approach using cryofixation for high-resolution 3D analysis by FIB-SEM. Jiansheng Guo, Guan Wang, Wen Tang, Dandan Song, Xinqiu Wang, Jian Hong, Zhongkai Zhang. Journal of Structural Biology (2020). https://doi.org/10.1016/j.jsb.2020.107600
EM ICE, EM AFS2, EM ACE200

Freeze substitution

1. **A tuneable minimal cell membrane reveals that two lipid species suffice for life.** Isaac Justice, Petra Kiesel, Nataliya Safronova, Alexander von Appen & James P. Saenz. Nature Communications (2024). https://doi.org/10.1038/s41467-024-53975-y
EM ICE, EM AFS2, EM GP, EM UC6

2. **Decoding the mechanical characteristics of the human anterior cruciate ligament entheses through graduated mineralization interfaces.** Jinghua Fang, Xiaozhao Wang, Huinan Lai, Wenyue Li, Xudong Yao, Zongyou Pan, Renwei Mao, Yiyang Yan, Chang Xie, Junxin Lin, Wei Sun, Rui Li, Jiajie Wang, Jiacheng Dai, Kaiwang Xu, Xinning Yu, Tengjing Xu, Wangping Duan, Jin Qian, Hongwei Ouyang & Xuesong Dai. Nature Communications (2024). https://doi.org/10.1038/s41467-024-53542-5
EM ICE, EM AFS2, EM UC7

3. **Membrane mechanics dictate axonal pearls-on-a-string morphology and function.** Jacqueline M. Griswold, Mayte Bonilla-Quintana, Renee Pepper, Christopher T. Lee, Sumana Raychaudhuri, Siyi Ma, Quan Gan, Sarah Syed, Cuncheng Zhu, Miriam Bell, Mitsuo Suga, Yuuki Yamaguchi, Ronan Chéreau, U. Valentin Nägerl, Graham Knott, Padmini Rangamani & Shigeki Watanabe. Nature Neuroscience (2024). https://doi.org/10.1038/s41593-024-01813-1
EM ICE, EM AFS2, EM UC7

4. **OPENPichia: licence-free Komagataella phaffii chassis strains and toolkit for protein expression.** Katrien Claes, Dries Van Herpe, Robin Vanluchene, Charlotte Roels, Berre Van Moer, Elise Wyseure, Kristof Vandewalle, Hannah Eeckhaut, Semiramis Yilmaz, Sandrine Vanmarcke, Erhan Çıtak, Daria Fijalkowska, Hendrik Grootaert, Chiara Lonigro, Leander Meuris, Gitte Michielsen, Justine Naessens, Loes van Schie, Riet De Rycke, Michiel De Bruyne, Peter Borghgraef & Nico Callewaert. Nature Microbiology (2024). https://doi.org/10.1038/s41564-023-01574-w
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