

# Marcus Gallagher-Jones

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## CURRENT POSITION

**University of California, Los Angeles** Los Angeles, CA  
Postdoctoral Fellow in Chemistry and Biochemistry **2017 – Present**

## EDUCATION

**University of Liverpool** Liverpool, UK  
PhD, Molecular Biophysics **2015**  
Thesis title: *New Science exploration from XFEL: a new paradigm for structural visualisation of macromolecules*

**Durham University** Durham, UK  
BSc, 2.1(hons), Molecular Biology and Biochemistry with Industrial placement. **2010**

## GRANTS AND AWARDS

**2020 M&M Postdoctoral Scholar Award** **2020**  
Microscopy Society of America

**Poster prize: Computational structural biology** **2018**  
UKSR50

**Collaboratory Fellowship** **2017 - 2019**  
UCLA/QCBio

**NVIDIA GPU seeding Grant** **2015, 2017 & 2018**  
NVIDIA corporation

**JSPS Short-term pre/post-doctoral fellowship Award** **2014**  
Japanese Society for the Promotion of Science

**RIKEN International Program Associate** **2011 – 2013**  
Inaugural student of the RIKEN/Liverpool Joint graduate program

**IUCr President's Fund for young researchers** **2012**  
Small Angle Scattering 2012 travel grant, International Union of Crystallographers

## RESEARCH EXPERIENCE

**University of California, Los Angeles** Los Angeles, CA  
Postdoctoral Fellow; Advisor: Jose Rodriguez **2017 - Present**  
*Method development for high-resolution cryo-electron microscopy/diffraction techniques to study biological and organic polymers.*

**University of California, Los Angeles** Los Angeles, CA  
Postdoctoral Fellow; Advisor: Jianwei Miao **2015 - 2017**  
*Algorithm development for x-ray/electron tomography experiments. Coherent Diffraction Imaging (CDI) of radiation sensitive biological material.*

**University of Liverpool/RIKEN SPRING8 Center** Liverpool, UK/ Hyogo Japan  
Postgraduate researcher; Advisors: S. Samar Hasnain and Tetsuya Ishikawa **2010 – 2014**  
*Method development for structural biology at X-ray Free Electron Lasers (XFEL).*

**Durham University** Durham UK  
Undergraduate researcher; Advisor: John. A. Gatehouse **Spring 2010**  
*Production of novel fusion protein biopesticides based on insecticidal toxins from arachnids*

**Wellcome Trust Sanger Institute** Cambridge, UK  
Undergraduate Researcher; Advisor: Gavin Wright **2008 – 2009**

## PUBLICATIONS

### ORIGINAL RESEARCH

1. **Gallagher-Jones, M.**, Bustillo, K.C., Ophus, C., Richards, L.S., Ciston, J., Lee, S., Minor, A.M., and Rodriguez, J.A. (2020). Atomic structures determined from digitally defined nanocrystalline regions. *IUCrJ* 7, 490–499.
2. Glynn, C., Sawaya, M.R., Ge, P., **Gallagher-Jones, M.**, Short, C.W., Bowman, R., Apostol, M., Zhou, Z.H., Eisenberg, D.S., and Rodriguez, J.A. (2020). Cryo-EM structure of a human prion fibril with a hydrophobic, protease-resistant core. *Nat. Struct. Biol.* 1–7
3. Tsui, H.S., Pham, N.V.B., Amer, B.R., Bradley, M.C., Gosschalk, J.E., **Gallagher-Jones, M.**, Ibarra, H., Clubb, R.T., Blaby-Haas, C.E., and Clarke, C.F. (2019). Human COQ10A and COQ10B are distinct lipid-binding START domain proteins required for coenzyme Q function. *Journal of Lipid Research*. jlr.M093534.
4. Ihm, Y., Cho, D.H., Sung, D., Nam, D., Jung, C., Sato, T., Kim, S., Park, J., Kim, S., **Gallagher-Jones, M.**, et al. (2019). Direct observation of picosecond melting and disintegration of metallic nanoparticles. *Nature Communications*. 10, 1–6.
5. Zee, C.-T., Glynn, C., **Gallagher-Jones, M.**, Miao, J., Santiago, C, G., Cascio, D., Gonen, T., Sawaya, M, R., Rodriguez J, A. (2019) Homochiral and racemic MicroED structures of a peptide repeat from the ice-nucleation protein InaZ. *IUCrJ* 6:2
6. **Gallagher-Jones, M.**, Ophus, C., Bustillo, K, C., Boyer, D, R., Panova, O., Glynn, C., Zee, C.-T., Ciston, J., Canton Mancina, K., Minor, A, M. & Rodriguez, J, A. (2019) Nanoscale mosaicity revealed in peptide microcrystals by scanning electron nanodiffraction. *Communications Biology* 2:26
7. Deng, J., Lo, Y.H., **Gallagher-Jones, M.**, Chen, S., Pryor, A., Jin, Q., Hong, Y.P., Nashed, Y.S.G., Vogt, S., Miao, J., and Jacobsen, C. (2018). Correlative 3D x-ray fluorescence and ptychographic tomography of frozen-hydrated green algae. *Science Advances* 4, eaau4548
8. **Gallagher-Jones, M.**, Glynn, C., Boyer, D.R., Martynowycz, M.W., Hernandez, E., Miao, J., Zee, C.-T., Novikova, I.V., Goldschmidt, L., McFarlane, H.T., et al. (2018). Sub-ångström cryo-EM structure of a prion protofibril reveals a polar clasp. *Nature Structural & Molecular Biology* 25, 131–134.
9. Hattne, J., Shi, D., Glynn, C., Zee, C.-T., **Gallagher-Jones, M.**, Martynowycz, M.W., Rodriguez, J.A., and Gonen, T. (2018). Analysis of Global and Site-Specific Radiation Damage in Cryo-EM. *Structure* 26, 759–766.e4.
10. Pryor, A., Rana, A., Xu, R., Rodriguez, J.A., Yang, Y., **Gallagher-Jones, M.**, Jiang, H., Kanhaiya, K., Nathanson, M., Park, J., et al. (2018). Single-shot 3D coherent diffractive imaging of core-shell nanoparticles with elemental specificity. *Scientific Reports* 8, 8284.
11. Lo, Y.H., Zhao, L., **Gallagher-Jones, M.**, Rana, A., Lodico, J., Xiao, W., Regan, B.C., and Miao, J. (2018). In situ coherent diffractive imaging. *Nature Communications* 9, 1826.
12. Pryor, A., Yang, Y., Rana, A., **Gallagher-Jones, M.**, Zhou, J., Lo, Y.H., Melinte, G., Chiu, W., Rodriguez, J.A., and Miao, J. (2017). GENFIRE: A generalized Fourier iterative reconstruction algorithm for high-resolution 3D imaging. *Scientific Reports* 7, 10409.

13. **Gallagher-Jones, M.**, Baraldi-Dias, C. S., Pryor, A. Jr., Bouchmella, K., Zhao, L., Lo, Y. H., Cardoso, M. B., Shapiro, D., Rodriguez, J., and Miao, J. (2017). Correlative ptychography with functionalized nanoparticles at the Fe L-edge. **Scientific Reports** 7, 4757
14. Kim, Y., Kim, C., Kwon, O.Y., Nam, D., Kim, S.S., Park, J.H., Kim, S., **Gallagher-Jones, M.**, Kohmura, Y., Ishikawa, T., et al. (2017). Visualization of a Mammalian Mitochondrion by Coherent X-ray Diffractive Imaging. **Scientific Reports** 7, 1850
15. Fan, J., Sun, Z., Wang, Y., Park, J., Kim, S., **Gallagher-Jones, M.**, Kim, Y., Song, C., Yao, S., Zhang, J. et al (2016) Single-pulse enhanced coherent diffraction imaging of bacteria with an X-ray free-electron laser. **Scientific Reports** 6.
16. Kim, S., Kim, S., Lee, S.Y., Kim, C., Kim, Y., Marathe, S., Song, C., **Gallagher-Jones, M.**, Kang, H.C. et al (2016) Coherent diffraction imaging using focused hard X-rays. **Journal of the Korean Physical Society** 68, 1083–1087.
17. Nam, D., Kim, C., Kim, Y., Ebisu, T., **Gallagher-Jones, M.**, Park, J., Kim, S., Kim, S., Tono, K., Yabashi, M. et al (2016) Fixed target single-shot imaging of nanostructures using thin solid membranes at SACLA. **Journal of Physics B: Atomic, Molecular and Optical Physics** 49, 34008.
18. **Gallagher-Jones, M.**, Bessho, Y., Kim, S., Park, J., Kim, S., Nam, D., Kim, C., Kim, Y., Miyashita, O., Tama, F. et al (2014) Macromolecular structures probed by combining single-shot free-electron laser diffraction with synchrotron coherent X-ray imaging. **Nature communications** 5.
19. Song, C., Takagi, M., Park, J., Xu, R., **Gallagher-Jones, M.**, Imamoto, N. & Ishikawa, T. (2014) Analytic 3D imaging of mammalian nucleus at nanoscale using coherent x-rays and optical fluorescence microscopy. **Biophysical journal** 107, 1074–1081.
20. Song, C., Tono, K., Park, J., Ebisu, T., Kim, S., Shimada, H., **Gallagher-Jones, M.**, Nam, D., Sato, T., Togashi, T. et al (2014) Multiple application X-ray imaging chamber for single-shot diffraction experiments with femtosecond X-ray laser pulses. **Journal of Applied Crystallography** 47, 188–197.
21. Xu, R., Jiang, H., Song, C., Rodriguez, J.A., Huang, Z., Chen, C.-C., Nam, D., Park, J., **Gallagher-Jones, M.**, Kim, S. et al (2014) Single-shot three-dimensional structure determination of nanocrystals with femtosecond X-ray free-electron laser pulses. **Nature communications** 5.
22. Nam, D., Park, J., **Gallagher-Jones, M.**, Kim, S., Kim, S., Kohmura, Y., Naitow, H., Kunishima, N., Yoshida, T., Ishikawa, T. et al (2013) Imaging fully hydrated whole cells by coherent x-ray diffraction microscopy. **Physical review letters** 110, 98103.
23. Nam, D., Park, J., **Gallagher-Jones, M.**, Shimada, H., Kim, S., Kim, S., Kohmura, Y., Ishikawa, T. & Song, C. (2013) Development of an adaptable coherent x-ray diffraction microscope with the emphasis on imaging hydrated specimens. **Review of Scientific Instruments** 84, 113702.
24. Sun, Y., **Gallagher-Jones, M.**, Barker, C. & Wright, G.J. (2012) A benchmarked protein microarray-based platform for the identification of novel low-affinity extracellular protein interactions. **Analytical biochemistry** 424, 45–53.

#### REVIEW ARTICLES

25. **Gallagher-Jones, M.**, Rodriguez, J. A. & Miao, J. (2016) Frontier methods in X-ray diffraction for High-Resolution Structure Determination. **Quarterly Reviews of Biophysics**. 49, e20

## SELECTED CONFERENCE PRESENTATIONS

1. "Nanobeam Electron Diffraction Tomography (nanoEDT): Pushing the limits of electron crystallography." **Invited speaker at 4th Southern California Cryo-EM Symposium 2019**, CalTech, USA
2. "Nanocrystals: Not What They Seem." **Invited speaker at the 5th Ringberg Workshop on Structural Biology**, Max Planck Institute, Germany, 2018
3. "*Investigating the Nano-Anatomy of Protein Crystals by STEM.*" **Invited speaker at Challenges in Structural Biology 2017**, HHMI Janelia Research Campus, USA, 2017
4. "*Nano-Architecture of Macromolecular Crystals Revealed by Nanobeam Electron Diffraction.*" **Invited speaker at 2nd Southern California Cryo-EM Symposium 2017**, Salk Institute, USA
5. "*Correlative cellular ptychography with functionalized nanoparticles at the Fe-L edge.*" **Invited speaker at ALS users meeting 2017**, Lawrence Berkeley National Laboratory, 2017
6. "*3D Coherent X-ray Diffractive Imaging of Biological Specimens using Synchrotron and XFEL Radiation.*" **Invited speaker at SSRL/SLAC users meeting**, SLAC, USA, 2015
7. "*Molecular structure determination by combining free-electron laser diffraction with synchrotron X-ray imaging: A case study on using an X-ray FEL and storage ring.*" **Invited talk at Daresbury Laboratory**, Warrington, UK, 2014
8. "Coherent Diffractive Imaging of Cells and Macromolecular Complexes at SPring-8 and SACLA" **Invited talk at Okinawa Institute of Science and Technology** - 2014
9. "*Development of a Digital Ion-trap (DIT) Mass Spectrometer for Gas-phase Scattering experiments at SACLA*" **Keynote talk at 15<sup>th</sup> International Small-Angle Scattering Conference**, Sydney, Australia, 2012