

Dr. David Mills

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Qualifications

- PhD : "Formation and characterisation of silicon meso- and nano-structures" 2006.
- MPhil : "Detector Control System embedded software and hardware for ATLAS level-1 calorimeter trigger." 2002
- BSc. Physics 1999

Career

- Lecturer in Imaging and Calcified Tissues : Dental Institute, Queen Mary UoL. since 2021
- X-Ray Microtomography Facilities Manager : Dental Institute, Queen Mary UoL. 2013 - 2021
- Part-time Lecturer in Heritage Science, Camberwell College of Arts, UAL. 2016 - 2019
- Post Doctoral Research Assistant, Dental Institute, Queen Mary UoL. 2009 - 2013
- Post Doctoral Research Assistant, School of Engineering, Queen Mary UoL. 2007 - 2009
- Post Doctoral Research Assistant, Physics Department, Queen Mary UoL. 2006 - 2007

Expertise

Mills is a scientist specialising in matter - radiation interactions and how these can be applied to imaging and diagnostics in a variety of modalities including x-ray tomography, optical and electron microscopy and spectroscopic techniques. He has designed and built equipment for many of the techniques he is proficient in.

Mills is an expert in x-ray tomography for hard tissue research, and sample preparation and microscopy of calcified tissues, including teeth, bone and calcified cartilage.

Mills has strong interests in heritage research and maintains a wide network of associates including historians, artists, performers, conservators and curators, with which he researches and publishes. He sits on the heritage science committee of the Royal Society of Chemistry and commissions and edits technical briefs produced by the committee for the Analytical Methods group of the Society.

Teaching & Supervision

Foundation Teaching

- Lecturer on mathematics, physics, calcified tissues and medical imaging for the Certificate in Clinical Foundation Studies (CCFS) course.
- Personal tutor for six CCFS students

Research Student Supervision

- Co-supervisor for Abdullah Holdar, PhD awarded in 2021
- Primary supervisor for Nazila Kazemigazestane, PhD submission due in 2027
- Co-supervisor for Nada Abohasel, DClinDent submission due in 2025
- First supervisor for Chen Wang, MSc Oral Biology awarded in 2022
- Co-supervisor for Hafsha Saiyed, MSc Oral Biology submission due 2023
- Informal ad-hoc supervision and support for two MSc students, and six PhD students.

Fellowships

- Fellow of the Higher Education Academy. 2018
- Digital Environment Research Institute (DERI) Fellow, 2021-present

Funding

- 2023 - **£10,000** Internal Award for a joint project with the Barts Pathology Museum and sculptor Janetka Platun
- 2023 - *10,000* Westfield Fund, with Dr Creswell-Boyes, Unfunded.
- 2023 - *£400,000* Capital Equipment Bid, Unfunded. Resubmitting at next call.
- 2022 - **£10,000** Queen Mary public engagement grant to work with Janetka Platun "On the art of teeth"
- 2022 - **£500** for an exhibition in the Queens' Building to showcase work done by an intern student I hosted.
- 2021 - *£300,000* Apex Award in association with KCL, Unfunded.
- 2019 - **DDK 10.69 M** Carlsberg Foundation, co-investigator on this project to investigate the biomolecular archive potential of beeswax and wax seals from historical documents.
- 2019 - *£100,000* Apex Award in association with KCL, Unfunded.
- 2019 - *£425,900* The Wellcome Trust - co-applicant on a Wellcome Trust multi-user equipment grant for laser ablation microtomy. Unfunded
- 2018 - **£10,000** Queen Mary public engagement grant for joint project with "COMM Museum voor Communicatie, The Hague, Netherlands"
- 2017 - **£300** Queen Mary public engagement grant.

Selected Publications

- Boyde, A., Mills, D., Abba, A. M., & Ezquiaga, M. C. (2023). Fleas and lesions in armadillo osteoderms. *Journal of Anatomy*. doi:10.1111/joa.13842. **[Impact Factor 2.91]**
- Al-Khafaji, T. J., Agha, B., Alhumadi, A., Alhamadi, W. W., Mills, D., Davis, G. R., Fleming, P. S. An Assessment of Mineral Concentration of Dental Enamel Neighbouring Hypothetical Orthodontic Brackets Using X-ray Microtomography. *Journal of Dentistry*, 104306. doi:10.1016/j.jdent.2022.104306 **[Impact Factor: 4.99]**

- Salles Rosa Neto, N., Englert, D., McAlister, W. H., Mumm, S., Mills, D., Veis, D. J., Whyte, M. P. (2022). Periarticular calcifications containing giant pseudo-crystals of francolite in skeletal fluorosis from 1,1-difluoroethane "huffing". *Bone*, 160. doi:10.1016/j.bone.2022.116421 [**Impact Factor 4.15**]
- Cresswell-Boyes, A. J., Davis, G. R., Krishnamoorthy, M., Mills, D., & Barber, A. H. (2022). Composite 3D printing of biomimetic human teeth. *Scientific Reports*, 12(1). doi:10.1038/s41598-022-11658-y [**Impact Factor 4.99**]
- Dambrogio, J., Ghassaei, A., Smith, D. S., Jackson, H., Demaine, M. L., Davis, G., Mills, D., Demaine, E. D. (2021). Unlocking history through automated virtual unfolding of sealed documents imaged by X-ray microtomography. *Nature Communications*, 12(1). doi:10.1038/s41467-021-21326-w [**Impact Factor 17.69**]
- Ali, W., Liu, D., Li, J., Pery, A. D., Herrada, N., Mills, D., Owen, R. A., Burton, P. A., Dong, D., Gannaway, G., Bushby, A. J., Dunstan, D. J. Nanostrain sensitivity in a wire torsion experiment. *Review of Scientific Instruments* 91:1 2020
- Cresswell-Boyes, A. J., Barber, A. H., Mills, D., Tatla, A., Davis, G. R. Approaches to 3D printing teeth from X-ray microtomography. *Journal of Microscopy*, 272(3), 207-212. 2018.
- Rosin, P. L., Lai, Y.-K., Liu, C., Davis, G. R., Mills, D., Tuson, G., Russell, Y. Virtual Recovery of Content from X-Ray Micro-Tomography Scans of Damaged Historic Scrolls. *Scientific Reports*, 8(1), 11901. 2018.
- Boyde, A., Mills, D., Ranganath, L. A., Gallagher, J. A. Laser ablation machined sections permit correlative studies of hdmps by X-ray microtomography, optical and scanning electron microscopy. *Osteoarthritis and Cartilage*, 26, S74-S75. 2018.
- Davis, G. R., Mills, D., Anderson, P. Real-time observations of tooth demineralization in 3 dimensions using X-ray microtomography. *Journal of Dentistry*, 69, 88-92. 2018.
- Gibson, A., Piquette, K. E., Bergmann, U., Christens-Barry, W., Davis, G., Endrizzi, M., Terras, M. An assessment of multimodal imaging of subsurface text in mummy cartonnage using surrogate papyrus phantoms. *Heritage Science*, 6(1), 7. 2018.
- Mills, D., Mitchell, A., Khine, S., Davis, G. High contrast XMT studies of in-situ electrochemical dissolution of broken dental tools. *Development In X-Ray Tomography 10* (p. 99670D). SPIE. 2016.
- Davis, G. Mills, D. 2D beam hardening correction for micro-CT of immersed hard tissue. *Development In X-Ray Tomography 10* (p. 996707). SPIE. 2016.
- Gallagher, J. A., Thomas, N., Donnelly, J. L., Jeffery, N., Mills, D., Davis, G. R., Boyde, A. High density mineralised protrusions from the tidemark into hyaline cartilage in human joints. *Osteoarthritis and Cartilage*, 23, A318-A319. 2015.
- Davis, G. R., Evershed, A. N. Z., Mills, D. Characterisation of materials: Determining density using X-ray microtomography. *Materials Science and Technology (United Kingdom)*, 31(2), 162-166. 2015
- Boyde, A., Davis, G. R., Mills, D., Zikmund, T., Cox, T. M., Adams, V. L., Gallagher, J. A. On fragmenting, densely mineralised acellular protrusions into articular cartilage and their possible role in osteoarthritis. *Journal of Anatomy*. 225(4), 436-446. 2014.

- Davis, G. R., Evershed, A. N. Z., Mills, D. Quantitative high contrast X-ray microtomography for dental research. *Journal of Dentistry*, 41(5), 475-482. 2013.
- Davis, G. R., Evershed, A. N. Z., Mills, D. Recent developments in the MuCAT microtomography facility. *Development In X-Ray Tomography VIII*, 8506, 85060E-85060E-7. SPIE. 2012.
- Davis, G., Evershed, A., Elliott, J., Mills, D. Quantitative x-ray microtomography with a conventional source. *Development In X-Ray Tomography VII* (pp. 78040I-78040I-8). SPIE. 2010.