

A fluorescence microscopy image showing numerous circular microbubbles. Some are outlined in bright green, while others are outlined in red. The background is dark. In the top right corner, there is a smaller inset image showing a similar scene with a white scale bar below it. A white scale bar is also present in the bottom right of the main image.

Case study
2020
University of
Oxford

Fusion between a drug-carrying microbubble and cells for the purposes of targeted therapy

“The Franklin provides a way of linking basic science into real medical outcomes through technology development

Turning expertise into a national resource

The Rosalind Franklin Institute is an opportunity for researchers at the University of Oxford to focus on answering some of the big questions in medicine and related areas of science that have concerned the world's top researchers for decades. Scientists in the University have been instrumental in helping to shape the goals and programme of The Franklin and are now deeply involved in driving forward many of the work-streams.

Among those who have played a key role is Professor Sir John Bell, Regius Chair of Medicine at Oxford University. His vision brought The Franklin to life and helped to secure its funding. Professor Gavin Sreaton, Head of Oxford's Medical Sciences Division, has also played a key strategic role in ensuring medical researchers across the University are involved.

Professor Jim Naismith, a Fellow in structural biology at Oxford, has been the Interim Director of The Franklin since 2017 and was appointed as its first full Director in June 2019, and has also been leading the Structural Biology theme. Sitting on this theme advisory panel alongside Professor Naismith are his Oxford colleagues Professor Peijun Zhang, who specialises in biological cryo-imaging, and Professor Dave Stuart, an expert in X-ray crystallography of viral and cellular proteins.

The University's physical scientists and engineers are also playing a leading role in other Franklin themes, with Professor Ronald Roy, head of the Department of Engineering Science, initially leading the Imaging with Light and Sound (INSIGHT) theme and his colleague Dr Robin Cleveland sitting on the theme's advisory panel.

Amongst other Oxford University researchers who have received funding under this theme is Professor Eleanor Stride, from the Institute of Biomedical Engineering, who will create the world's most advanced ultra-fast video camera. She will use the new capability to explore ways of releasing potent anti-cancer drugs only at specific sites being treated, for example by using directed ultrasound, with the aim of increasing both treatment efficiency and reducing debilitating side-effects. The new instrument will be capable of capturing up to 100 million frames per second across a wide spectrum of light, from the ultraviolet to the infrared, and will capture the dynamics of how therapeutic molecules interact with cells.

"The Franklin provides a way of linking basic science into real medical outcomes through technology development," says Professor Patrick Grant, Pro-Vice-Chancellor (Research) at Oxford and its member representative at The Franklin.

Elsewhere, Professor Dame Carol Robinson, Professor of Physical Chemistry at the University of Oxford, a pioneer in biological mass spectrometry, was one of the original team who devised the concept for The Franklin. She is now a member of the Biological Mass Spectrometry theme's advisory panel.

Professor Angus Kirkland, from the Department of Materials, appointed as science director and Dr Judy Kim as deputy of the Correlated Imaging theme which will develop new ways of imaging biological samples over a range of length and time-scales as the lead of the Correlated Imaging theme. Most particularly he is focused on building a cutting-edge time resolved electron microscope. Professor Kirkland is also working with colleagues in medical sciences to find new, more effective ways of preparing samples for use in these instruments.

"It takes significant resource and know-how to build a cutting-edge electron microscope, and it is something any single university will struggle to achieve alone," says Professor Grant. "But with academic and industry partners, The Franklin has provided a fantastic opportunity to build this type of instrumentation that can lead the world, and to set it in an open, collaborative environment that provides a national resource."



Professor Patrick Grant,
Pro-Vice-Chancellor
(Research)



The Rosalind
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