

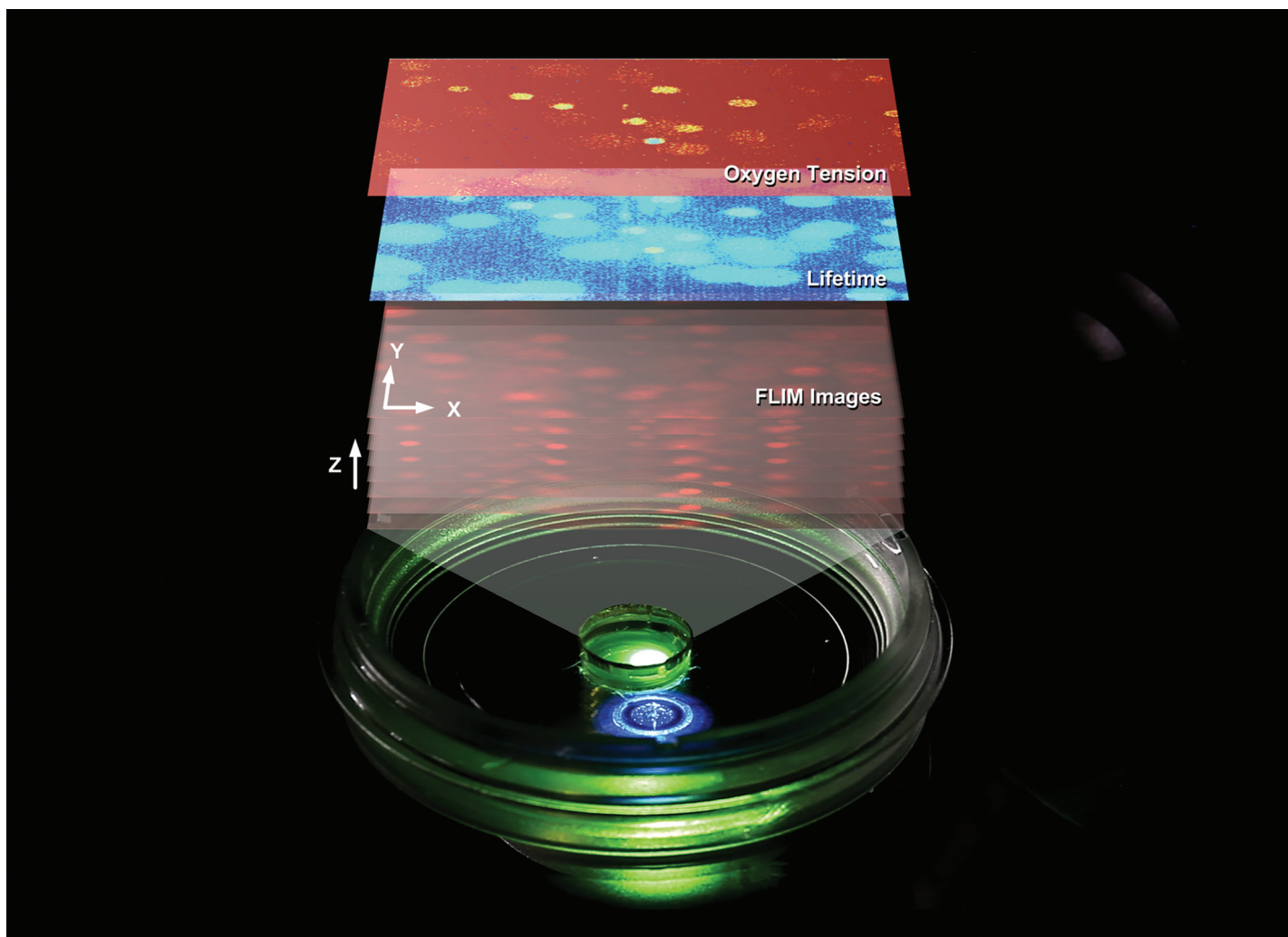
RSC Applied Polymers

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**Fundamental questions
Elemental answers**



Showcasing research from Professor Tung's laboratory, Research Center for Applied Sciences, Academia Sinica, Taipei, Taiwan, and Professor Wu's laboratory, Department of Biomechatronics, National Taiwan University, Taipei, Taiwan.

Rapid time-lapse 3D oxygen tension measurements within hydrogels using widefield frequency-domain fluorescence lifetime imaging microscopy (FD-FLIM) and image segmentation

We developed an approach integrating the widefield FD-FLIM system and imaging segmentation for rapid time-lapse 3D oxygen tension measurement in hydrogels. For the measurement, the oxygen-sensitive fluorescence microbeads were mixed inside the hydrogel, and the z-stack images were automatically acquired using a motorized stage. The collected images are analyzed offline using a machine learning algorithm to identify the three-dimensional positions of the microbeads. The application of the approach to study oxygen microenvironment change for *in vitro* cell culture has also been demonstrated in the experiments.

As featured in:



See Hsiao-Mei Wu, Yi-Chung Tung *et al.*, *Analyst*, 2024, **149**, 1727.