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Line Scanning Mechanical Streak Camera for Phosphorescence Lifetime Imaging

High-throughput, low-noise phosphorescence imaging system with 80% quantum efficiency.

Researchers at Purdue University have developed a new line scanning mechanical streak CMOS camera for phosphorescence lifetime imaging. This technology exhibits improved signal-to-noise ratio over current CMOS camera imaging and allows for higher throughput between tens of nanoseconds to hundreds of microseconds. An experiment was designed with samples of platinum-octaethyl-porphyrin (PtOEp) which were dissolved in toluene and mounted to glass slides for photon scanning. The camera fine-tuned by Purdue researchers captured 256 vertical lines of photon data from PtOEp samples within 25.6 seconds and indicated the material lifetime as 14 nanoseconds. By comparison, a photomultiplier tube (PMT) array took 1600 cycles to measure just 30 photons incurred a 100-nanosecond delay as well as produced considerable detector noise. The new CMOS camera allows from hundreds to thousands of line streaks to be scanned at one time with high quantum efficiency (QE) at least 80% in a single camera frame. Life science and materials science researchers can benefit from this accurate, high-throughput, and reliable solution for phosphorescence lifetime imaging.

Advantages:

-High-Throughput

-Reliable

-Accurate

-Improved SNR

-Improved Quantum Efficiency

Potential Applications:

-Materials Science

Technology ID

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Category

Artificial Intelligence & Machine Learning/3D Optical Imaging & Industrial Metrology
Materials Science & Nanotechnology/Nanomaterial Characterization & Imaging Tools

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View online

-Life Science

Technology Validation:

Tested with a new material that has potential has an LED and compared between new CMOS camera and existing PMT method for SNR and high throughput.

Recent Publication:

"Line scanning mechanical streak camera for phosphorescence lifetime imaging"

The Optical Society's Optics Express Journal

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TRL: 5

Intellectual Property:

Provisional-Gov. Funding, 2020-08-25, United States

Utility-Gov. Funding, 2021-08-25, United States

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