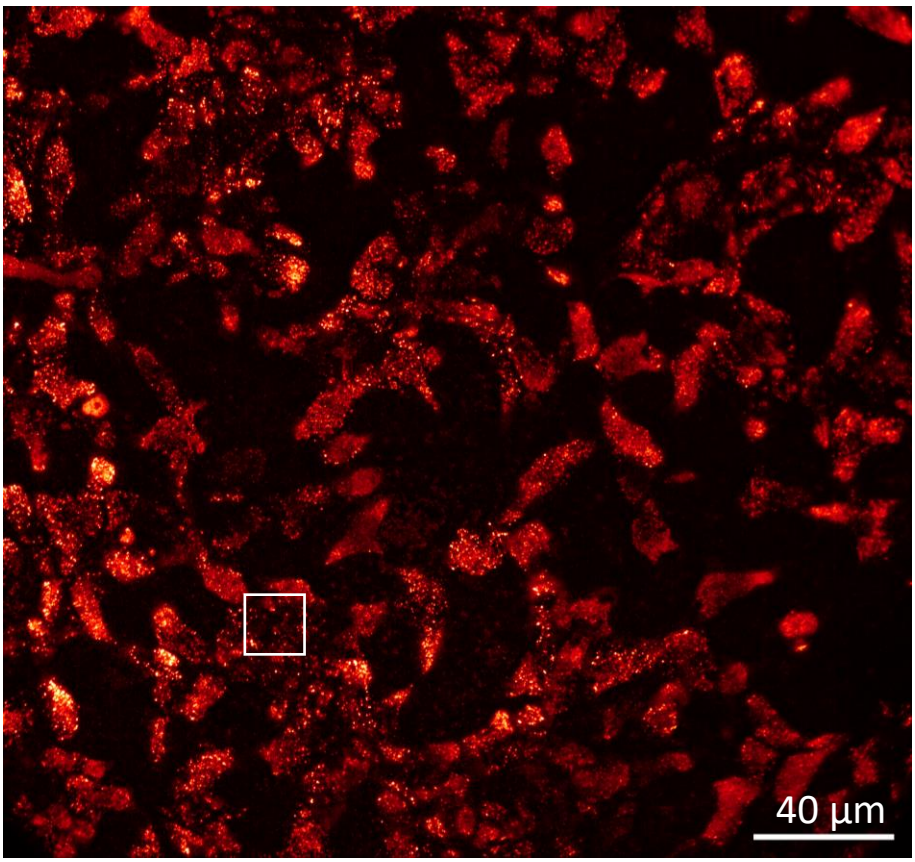
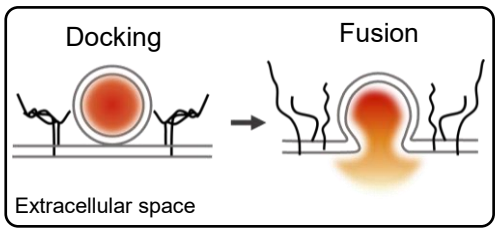
GRANULE SECRETION - EXOCYTOSIS

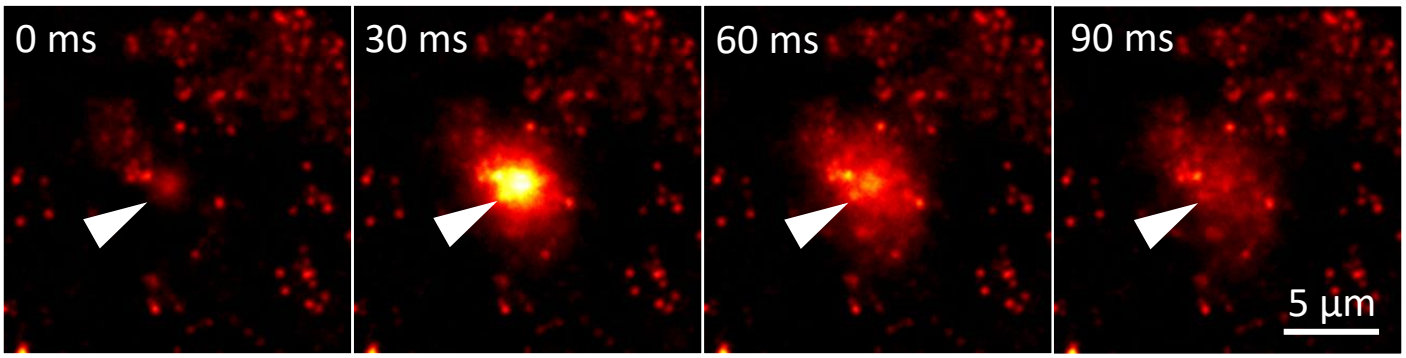


Insulin secretion is critical to regulate blood sugar levels and any dysregulation can have significant implications for disease. Upon detection of high blood sugar insulin is secreted, stimulating cells to absorb sugar from the blood, effectively lowering the blood sugar level. Insulin is stored within granules that fuse with the plasma membrane upon stimulation. This important biological process is known as exocytosis.

In the image to the left, the granule content has been fluorescently labeled. Upon stimulation with glucose the cargo is releases, thereby indirectly visualizing the release of insulin. This first appears as a faint red foci that intensifies as the vesicle approaches the cell membrane. As the granule fuses with the membrane the content leaks out of the cell, resembling a firework-like event.



The image is a still frame taken from the timelapse available on our webpage: **chipnano.com**. The granules fill the entire cell volume making it necessary to use total internal reflection fluorescence microscopy (TIRFM) to ensure that only the fluorescent signal at the cell surface is visible. Additionally, due to the heterogeneity of cells and the downstream signaling effects of insulin, the release-per-cell itself can vary greatly. ACP ZERO achieves the largest TIRF field of view. The image above achieves a uniformly illuminated field of view across 260 x 260 um, with a time resolution of 30 frames per second. Below is a magnified timelapse of a granule secretion event.

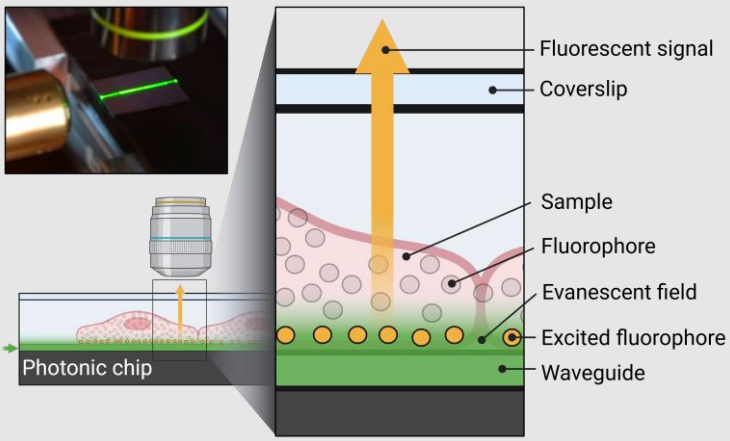


chipnano imaging

Wiley Analytical Science Award Winner
First Place 2024

ACP ZERO STANDARD

TECHNICAL SPECIFICATIONS

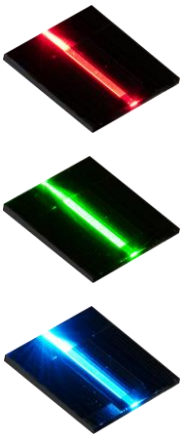


WORKING PRINCIPLE

ACP ZERO is an accessible and robust TIRF imaging platform. Our multimode waveguide technology decouples the illumination and imaging pathways. The imaging path follows conventional standards, while the illumination path occurs via built-in waveguides on the surface of a photonic chip. There are several parallel waveguides on top of the chip, allowing for imaging within an active waveguide while preserving the neighboring fluorophores. The sample is placed or grown directly on top of the chip. After automatic laser coupling into a selected waveguide, an evanescent field penetrates the sample and excites the fluorophores which are then detected by an upright microscope.

SYSTEM SPECIFICATIONS

Standard model, customizable options



Camera unit

Sensor type:	Scientific CMOS
Pixel count:	3200x3200

Laser unit

Standard wavelengths:	491 nm, 561 nm, 640 nm
Customizable laser lines:	TBD

White light source (EPI)

Technology:	200W metal halide

Objective lenses

Lens turret:	2 objectives, simultaneously mounted
Lens selection:	- 60x NA 1.2W - 25x NA 0.8 - 20x NA 0.45 - 10x NA 0.4
Lateral resolution:	50 nm @ 60x (SMLM) 75 nm @ 25x (SMLM) 140 nm (SMLM) @20x Diffraction limited and DV enhanced
Software:	Acquisition software Post-processing suite with GPU-accelerated visualization and reconstruction for SMLM data, and deconvolution software

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