P1.18

Fluorescence Based Multi-Color Two-Dimensional Flow Cytometer Utilizing Masked SPAD Array

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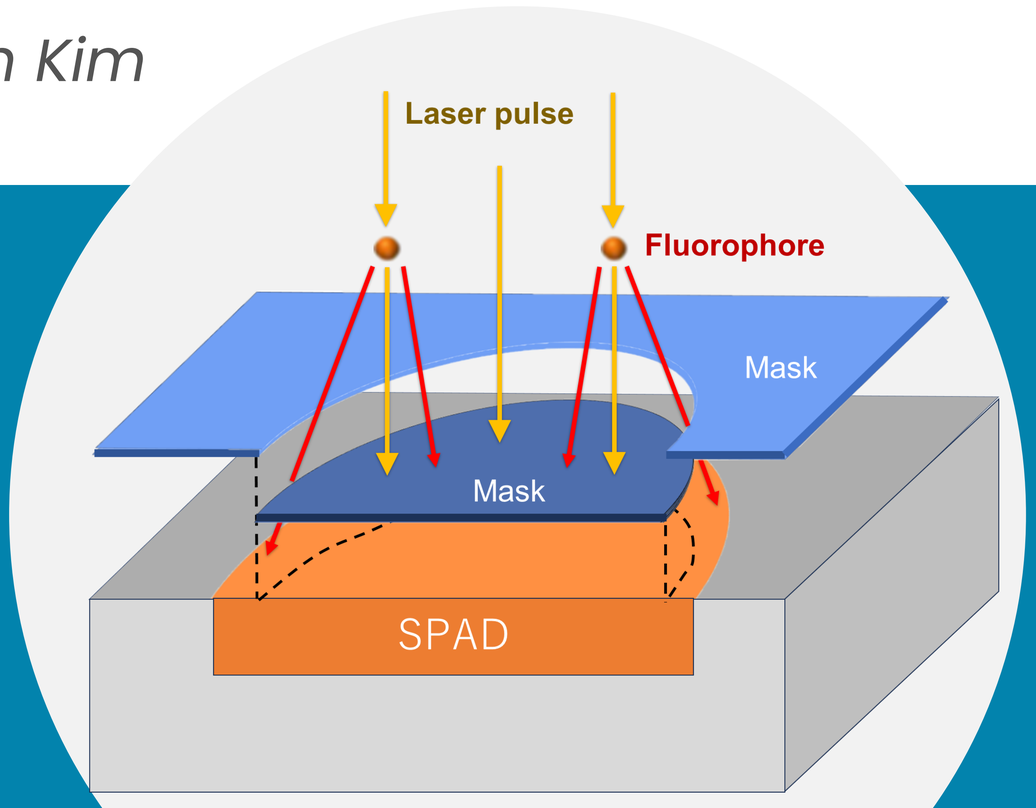
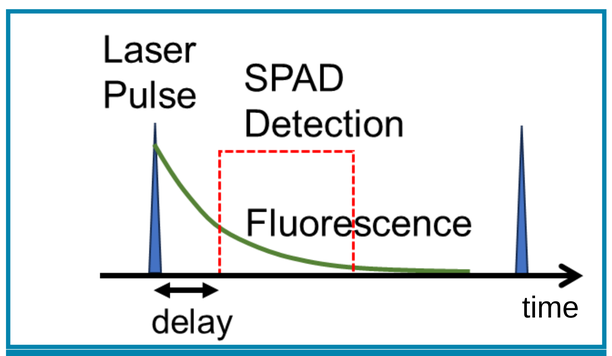
Masking SPAD from excitation laser light effectively improves S/N of SPAD's time domain fluorescence detection



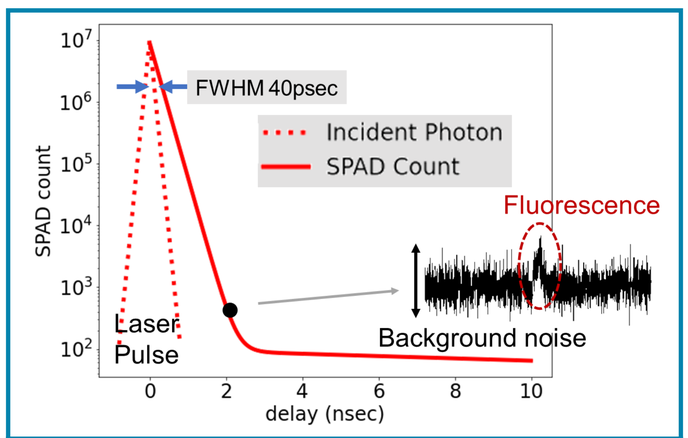
Time Domain fluorescence Detection with gated SPAD

- Time-gated SPADs enable fluorescence detection without the use of optical filters by closing the gate during excitation irradiation.



Temporal domain fluorescence detection

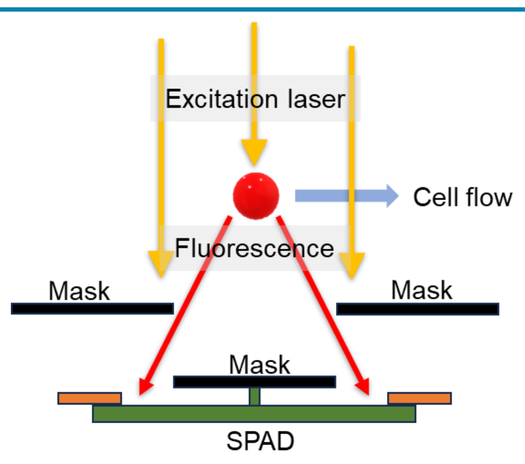
- However, SPAD's residual diffusion tail significantly increases background noise.



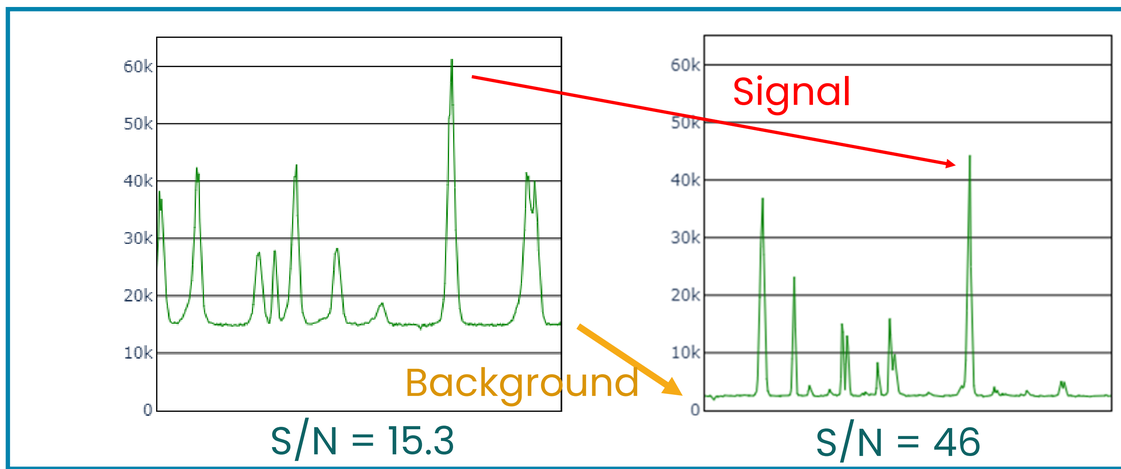
Diffusion tail of SPAD

Masking SPAD from excitation pulse to increase S/N

- By masking SPAD with aligned metals, the laser's photons falling on to the SPAD perpendicularly are almost blocked and only the fluorescence emitted in all directions can reach the SPAD. S/N for fluorescence improves by three times.



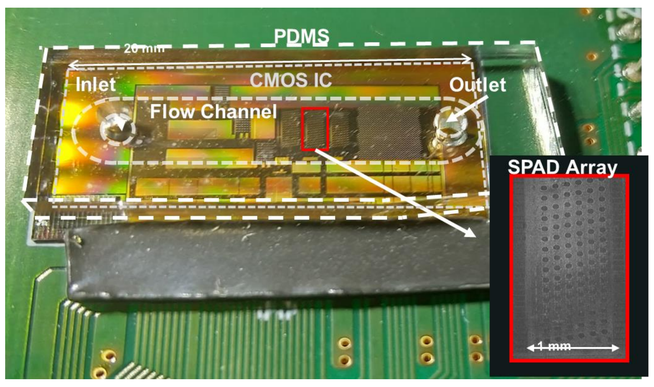
Masked SPAD structure



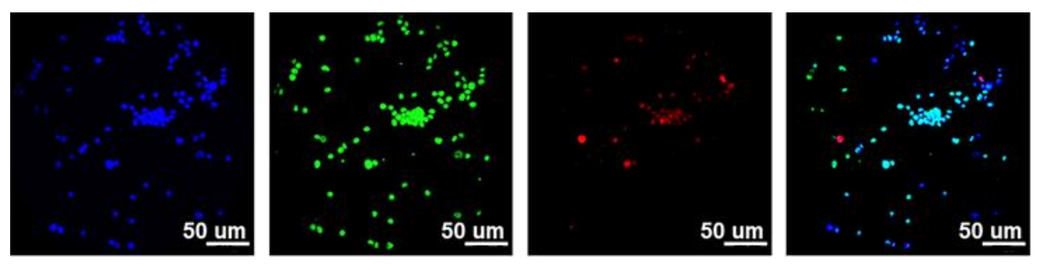
Signal to Noise ratio for fluorescence improves 3 times

With Masked SPAD 2DFC can detects immunostained proteins

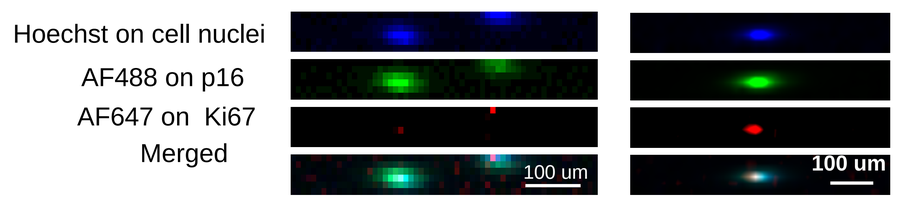
- With masked SPAD structure, 2DFC can now detect immunostained proteins (p16 and Ki67) on cervical cancer cells.



2DFC device



Fluorescent microscopy images of immunostained HeLa cells



Visualized 2DFC output of immunostained HeLa cells

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