

NanoPattern
TECHNOLOGIES



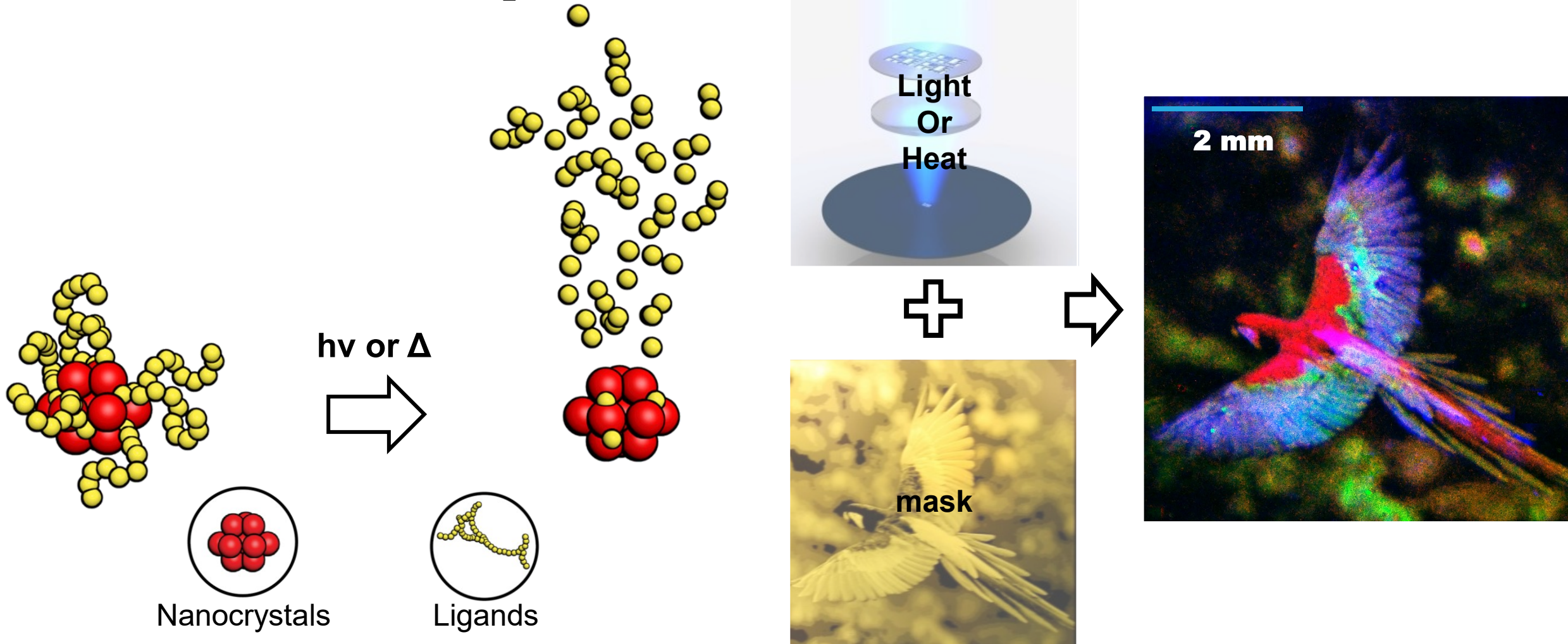
High Optical Density Quantum Dot Pixel Color Conversion Films for Displays



Yu Kambe CEO, Co-founder

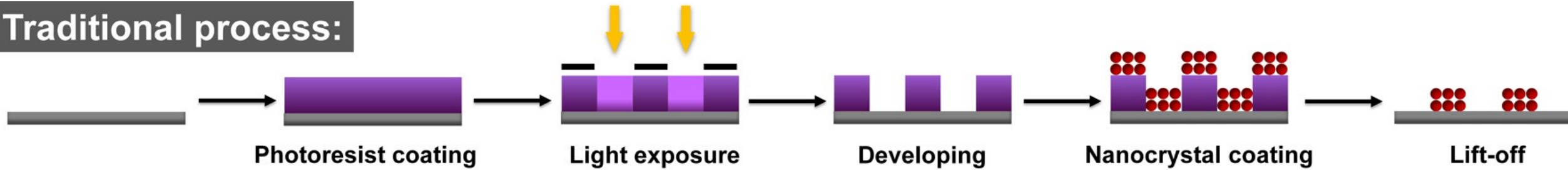


Technology – photodegradable ligands no resin matrix required

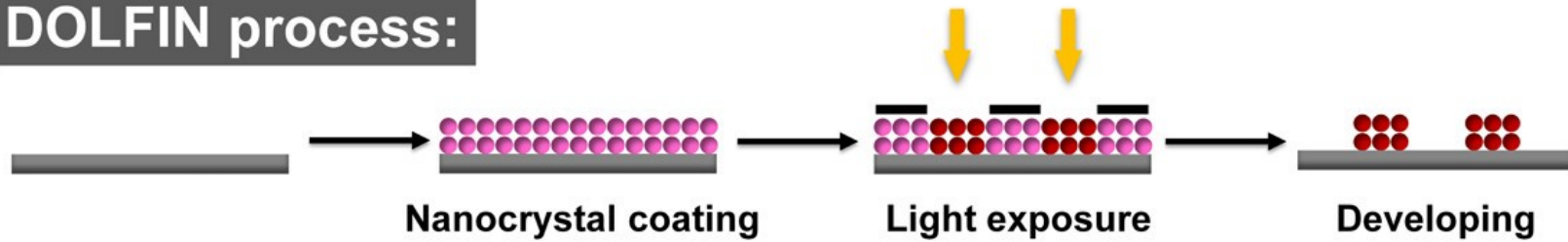


Wang, Y., Fedin, I., Zhang, H., & Talapin, D. V. (2017). *Science*, 357(6349), 385-388.
Wang, Y., Pan, J. A., Wu, H., & Talapin, D. V. (2019). *ACS nano*, 13(12), 13917-13931.

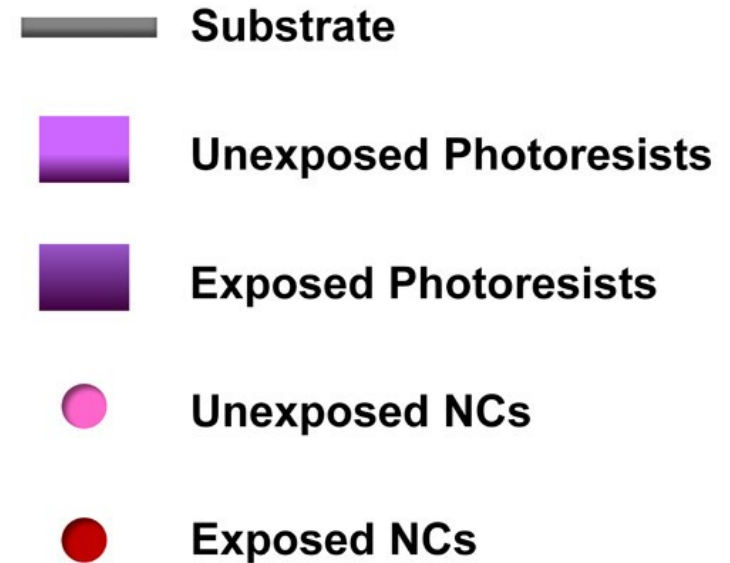
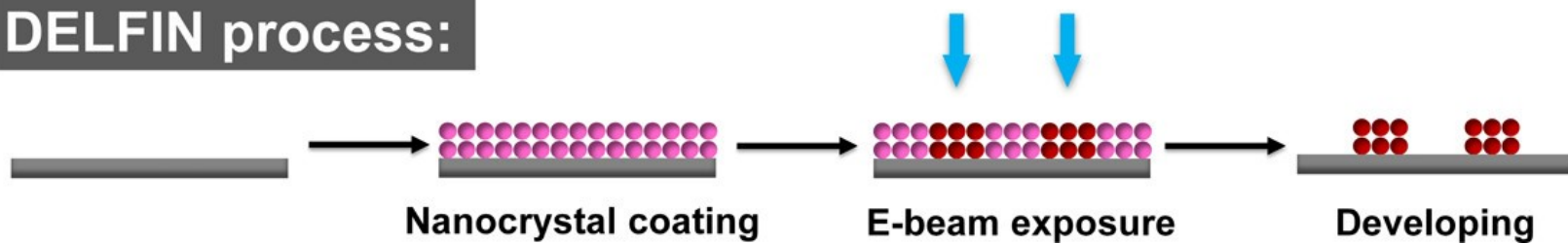
Traditional process:



DOLFIN process:



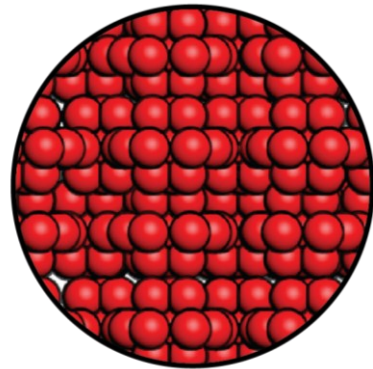
DELFIN process:



NanoPattern can photopattern dense QD films

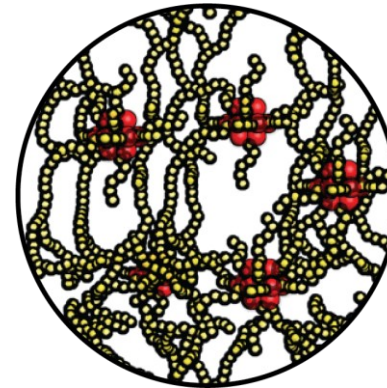
70%*

Solid Volume



40%

Solid Volume



Conventional Approach:
Nanocrystals in organic resin

*Volume fraction for NanoPattern based on high packing limitation of spheres ~74%. 

NanoPattern is
not a QD manufacturer
the technology can work
with anyone's QD
(and other nanoparticles)



Micro displays

Unmet needs

<5 μm

Lateral resolution

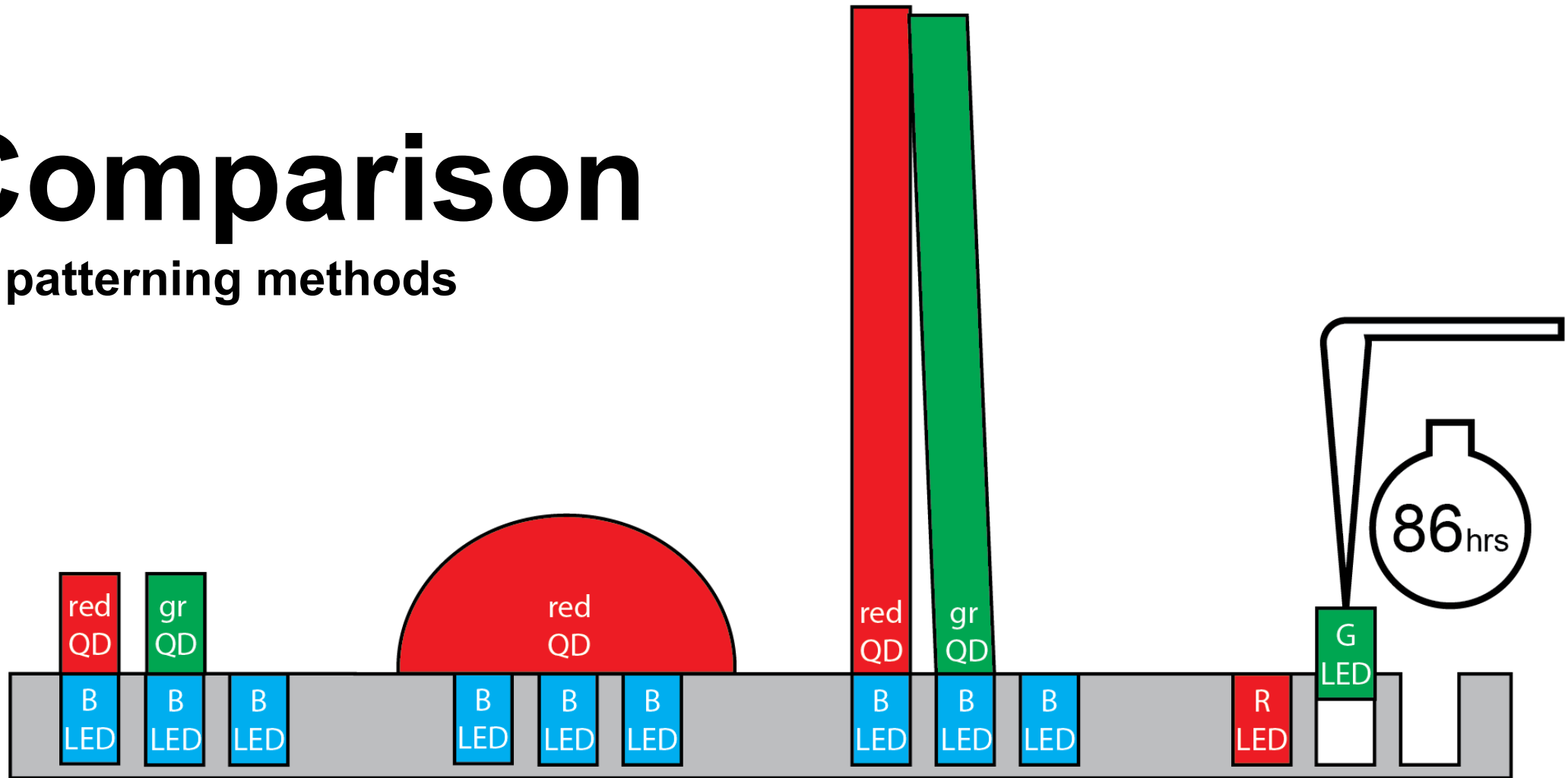
High QY

At 50-150 °C temperatures
And high brightness



Comparison

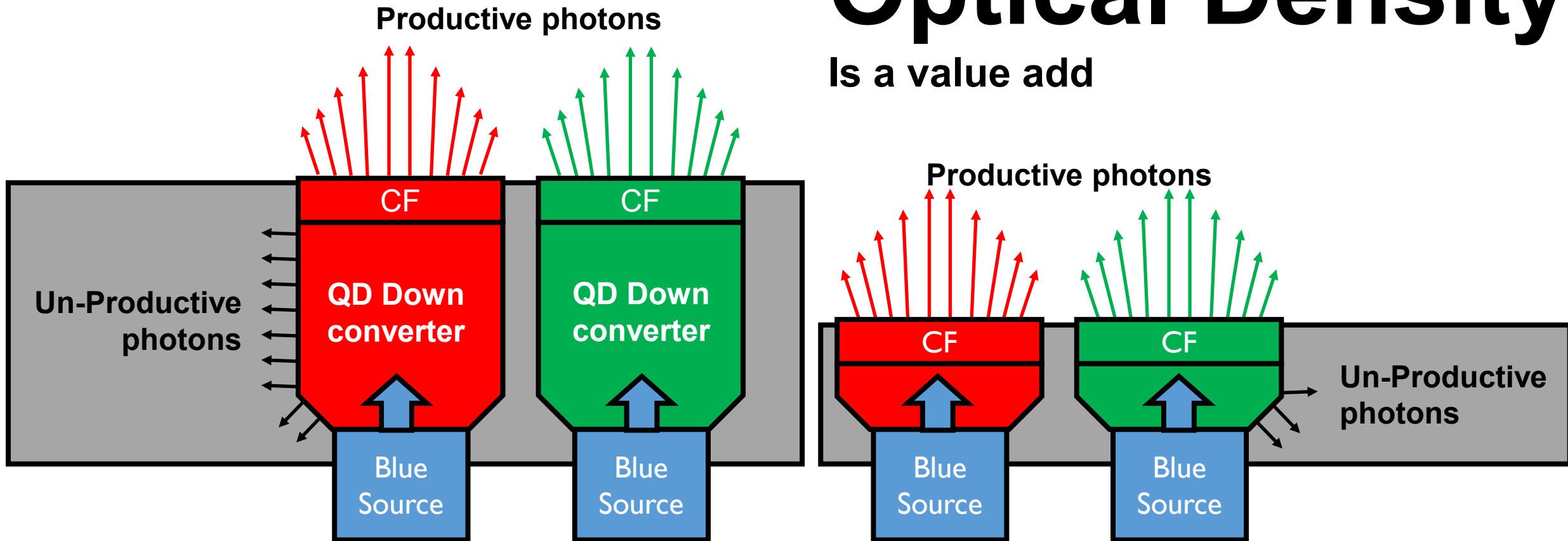
Of patterning methods

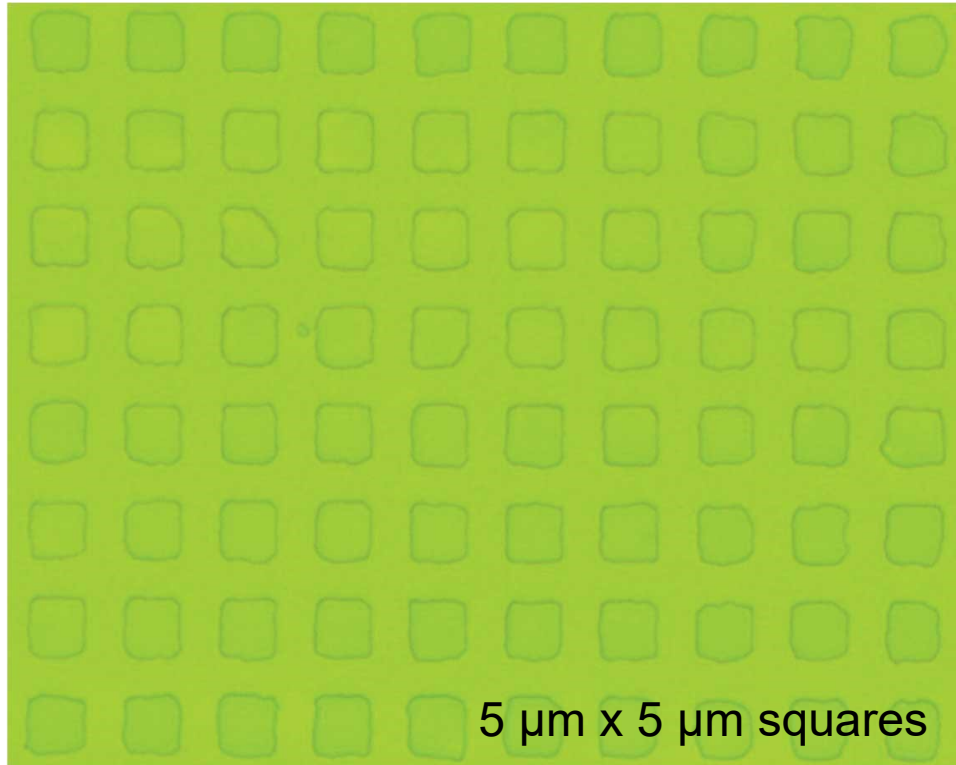


For all display downconverters

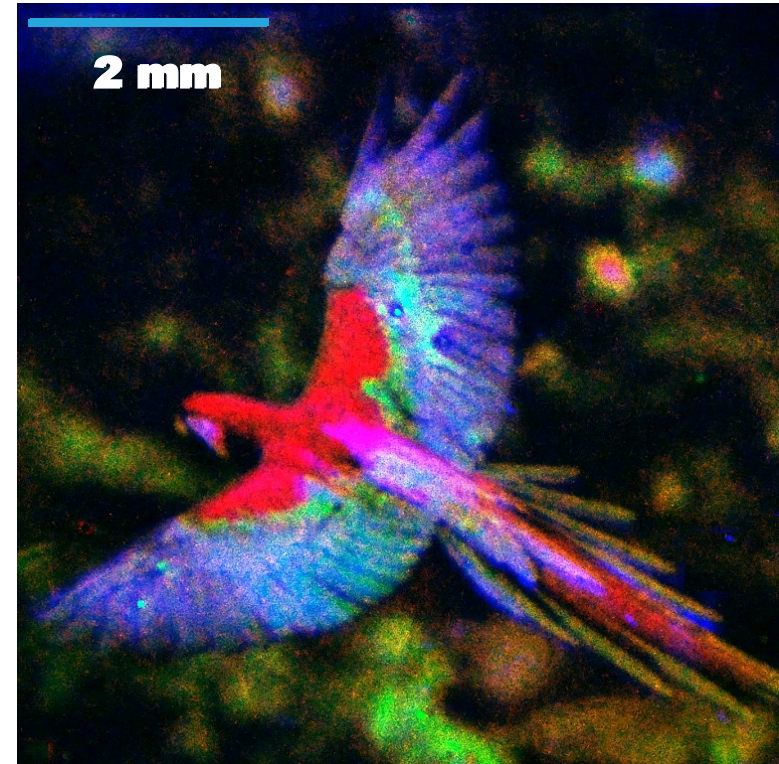
Higher Optical Density

Is a value add





5 μm lateral resolution



Multi patterning



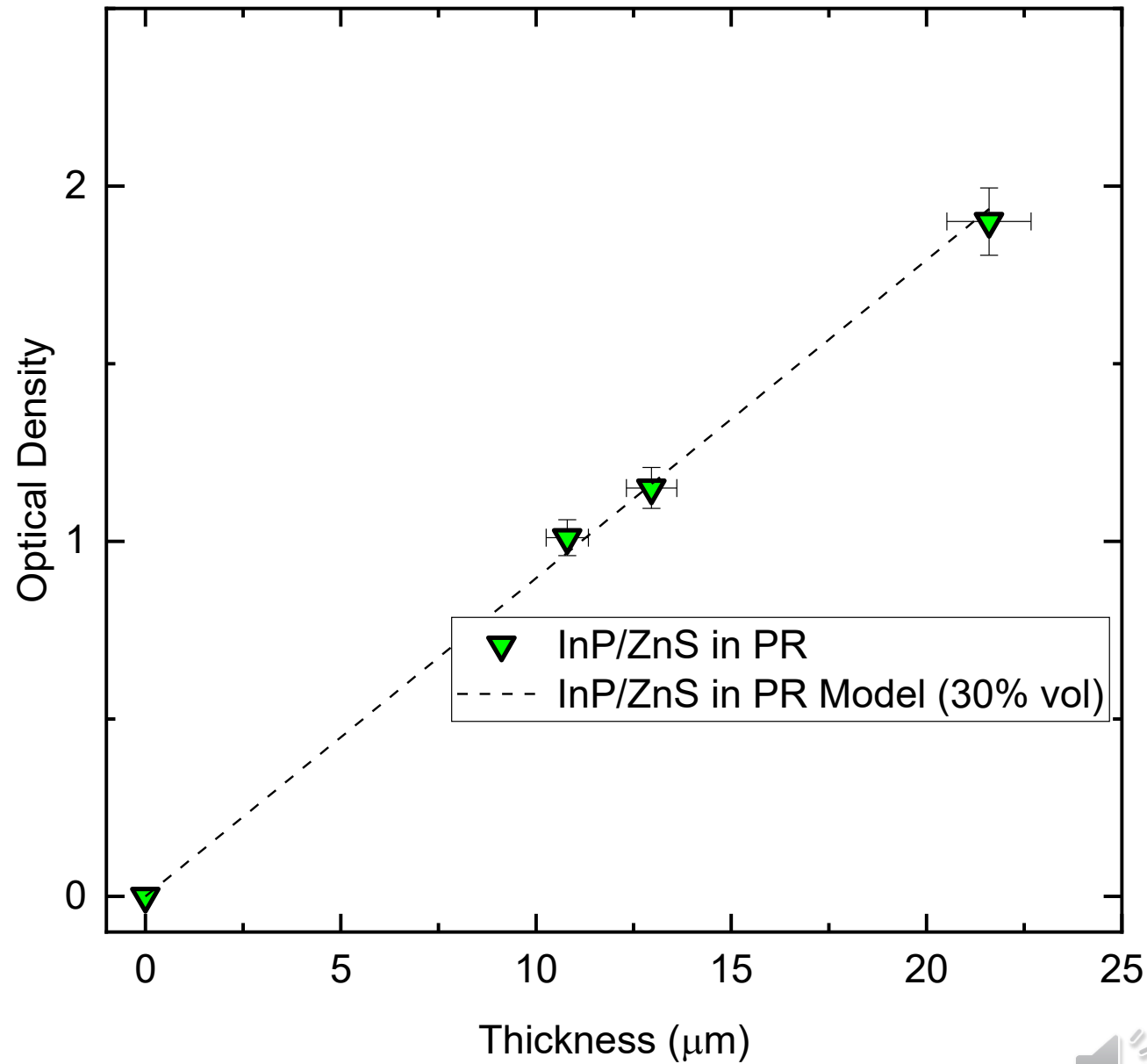
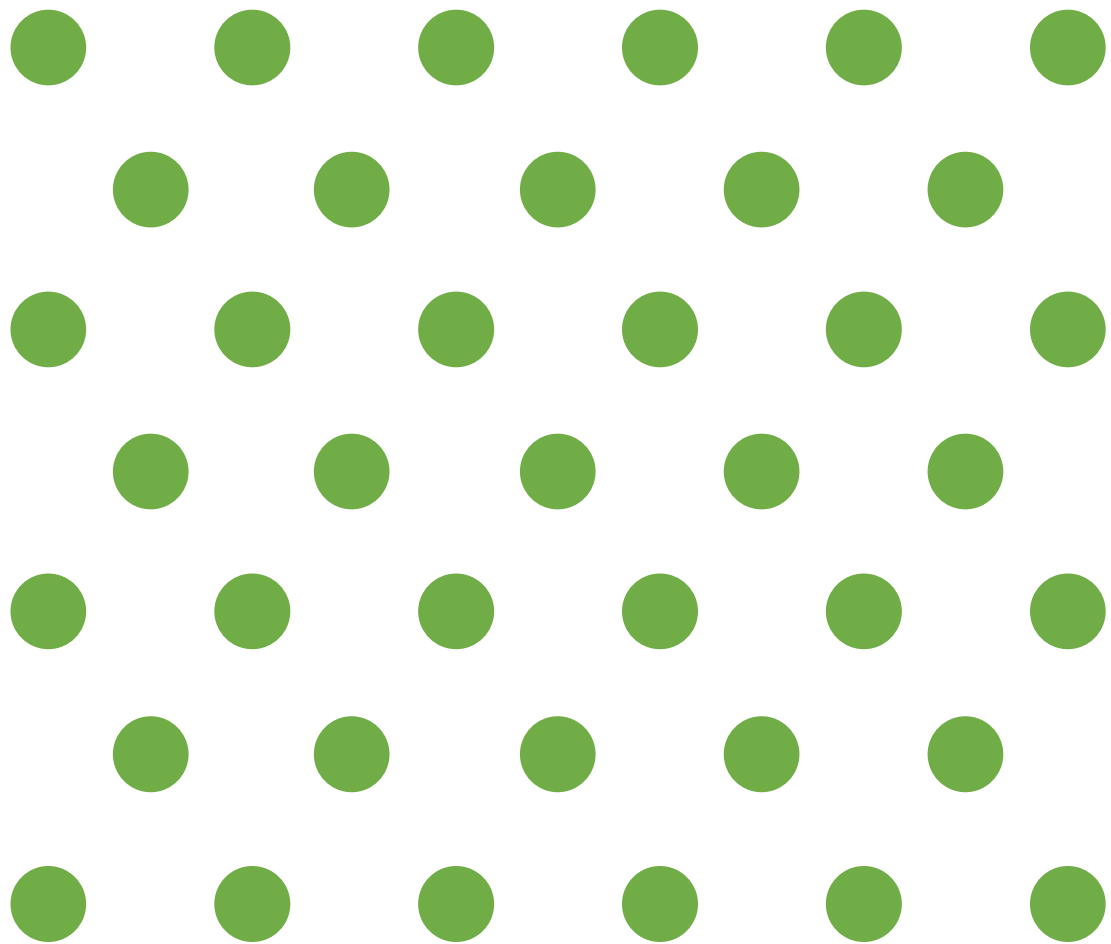


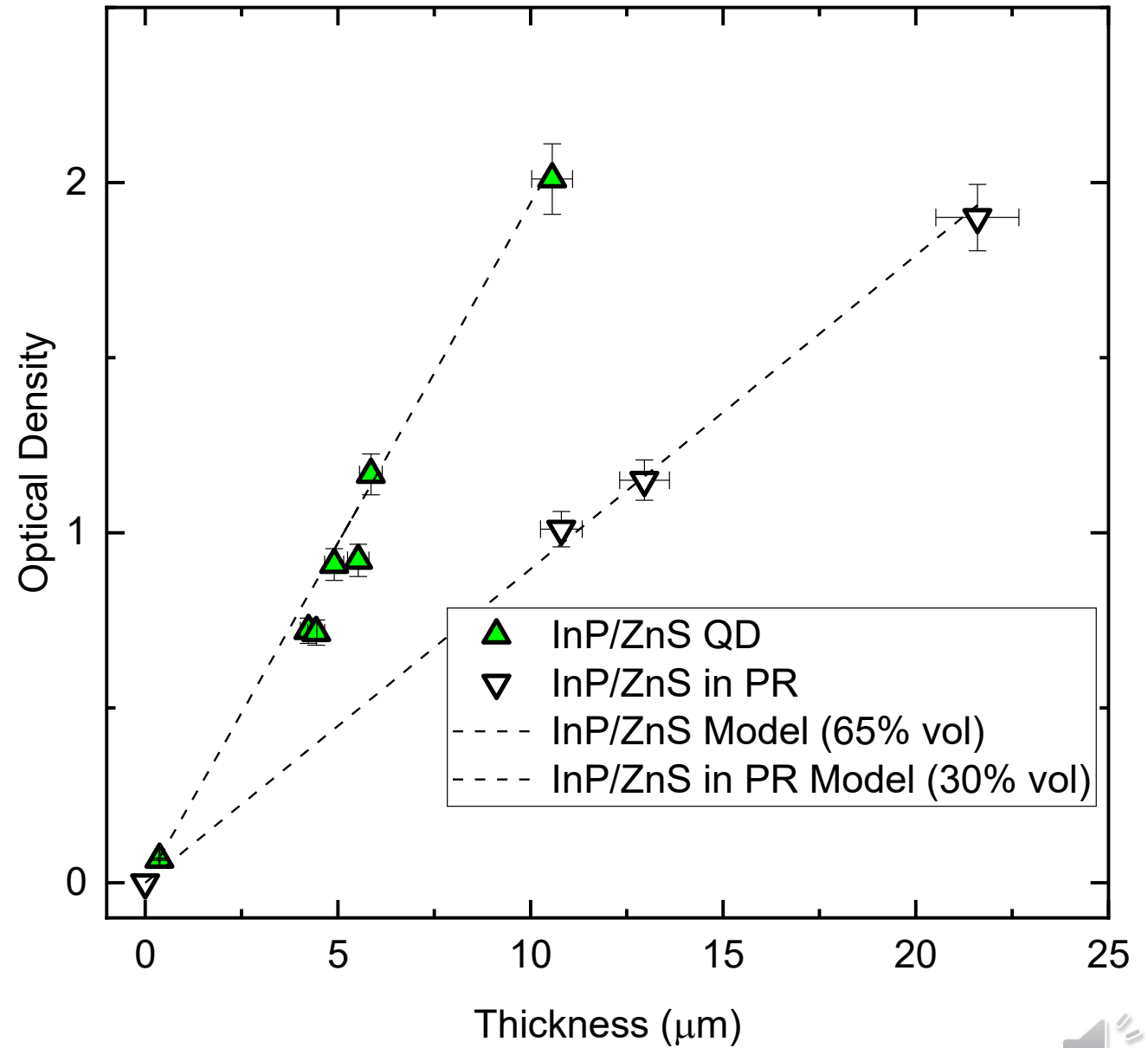
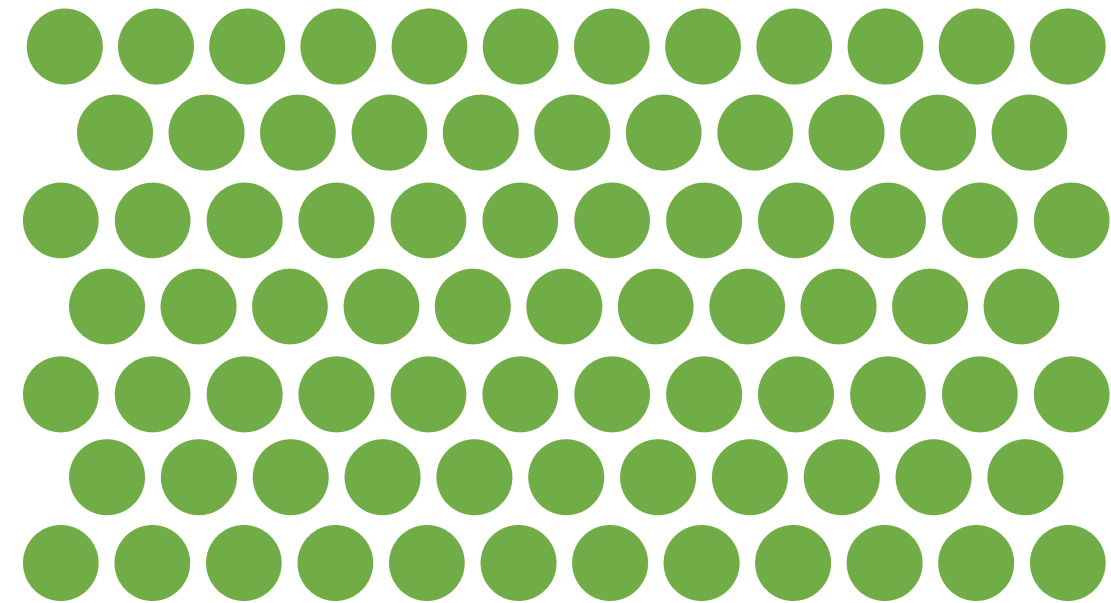
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TOPIC

Optical Density







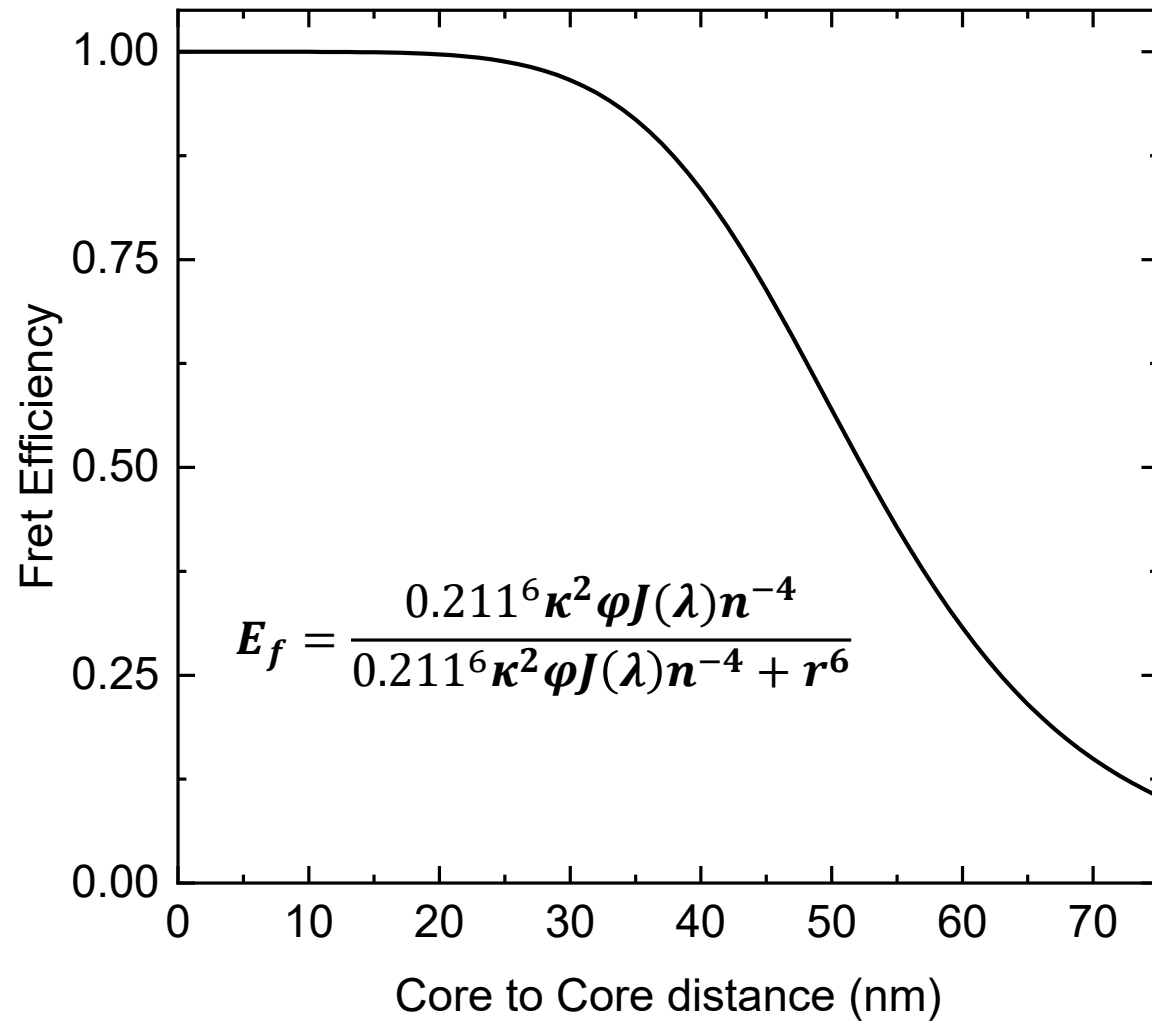


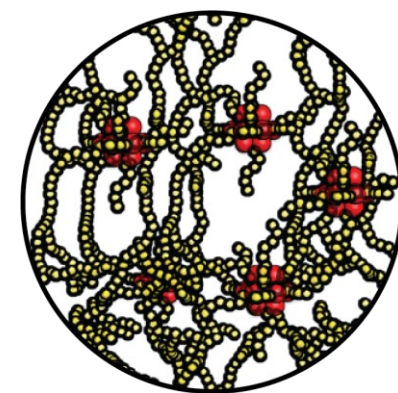
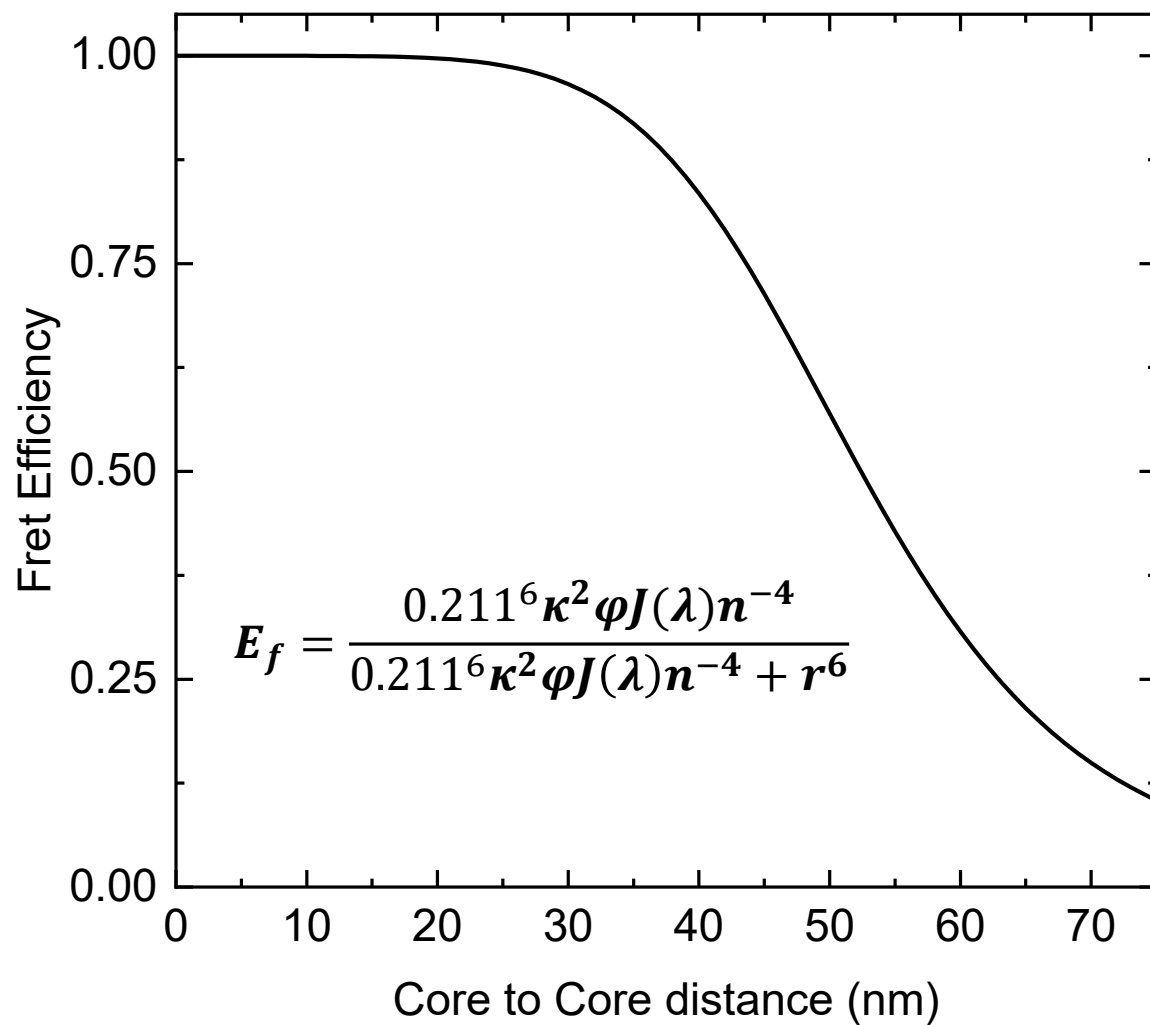
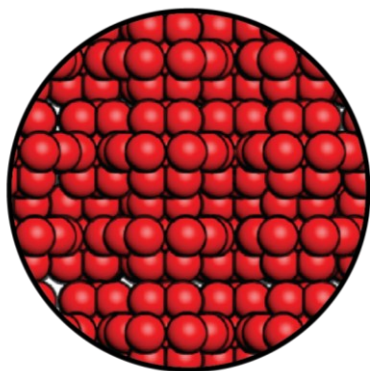
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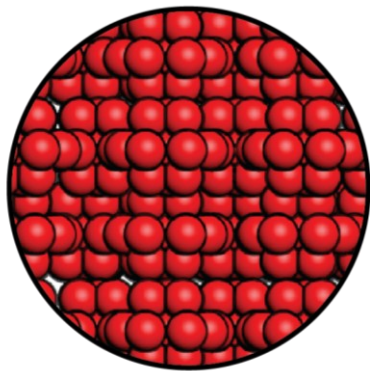
TOPIC

Preserving QY in dense films

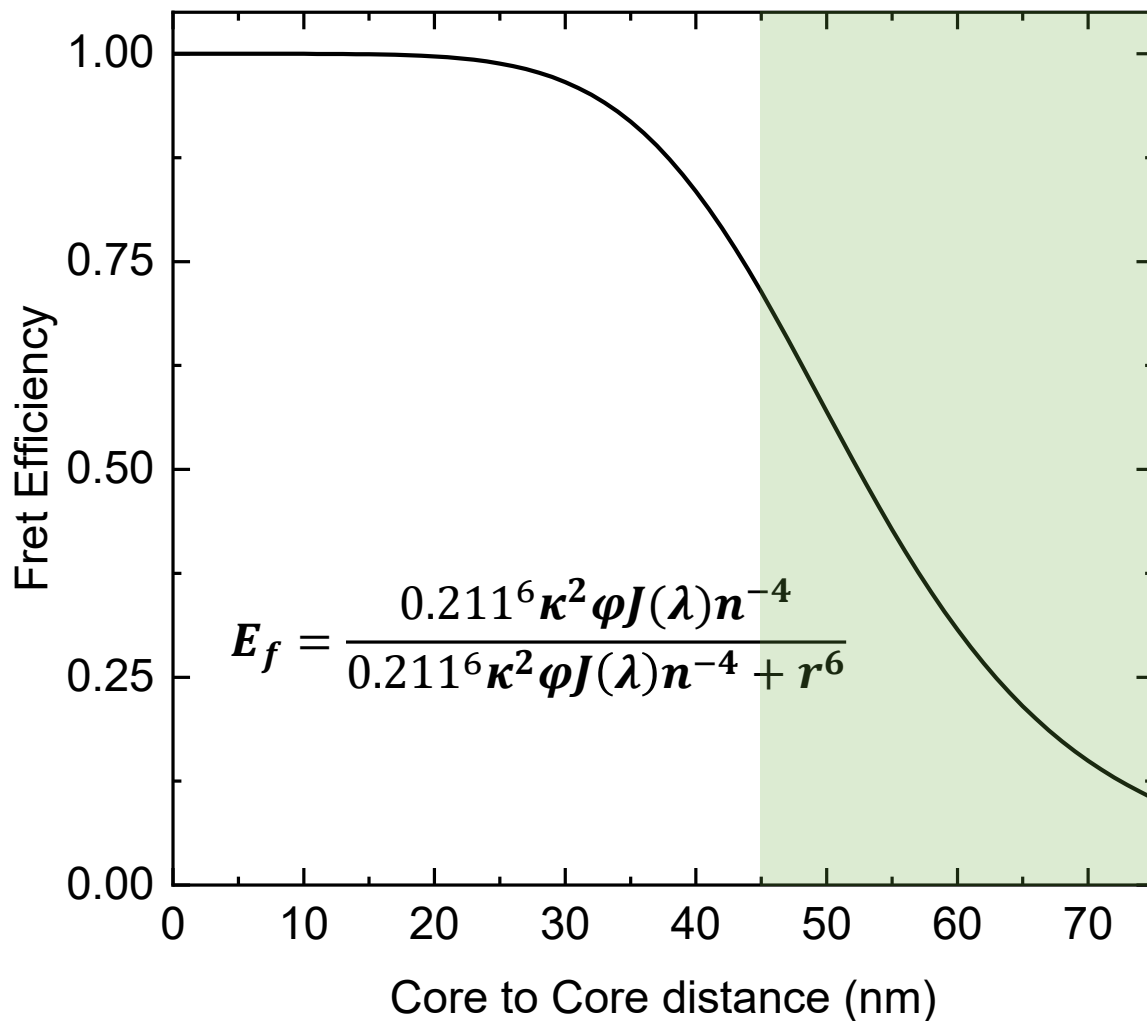




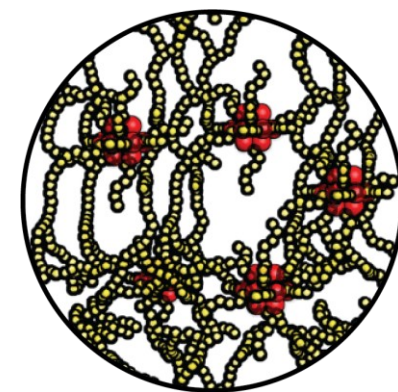




With the right controls you can live with Energy Transfer



It takes a lot of separation to keep Energy Transfer Low



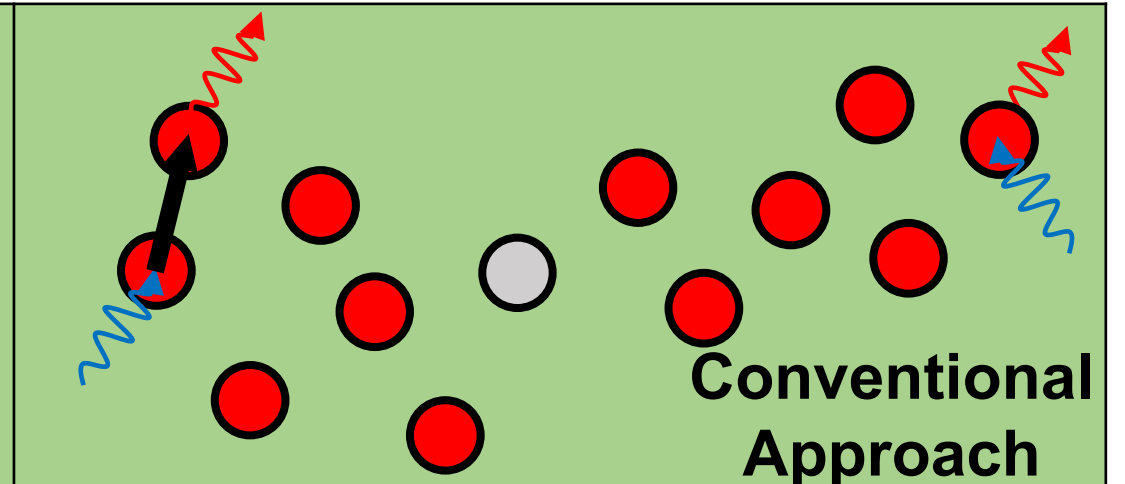
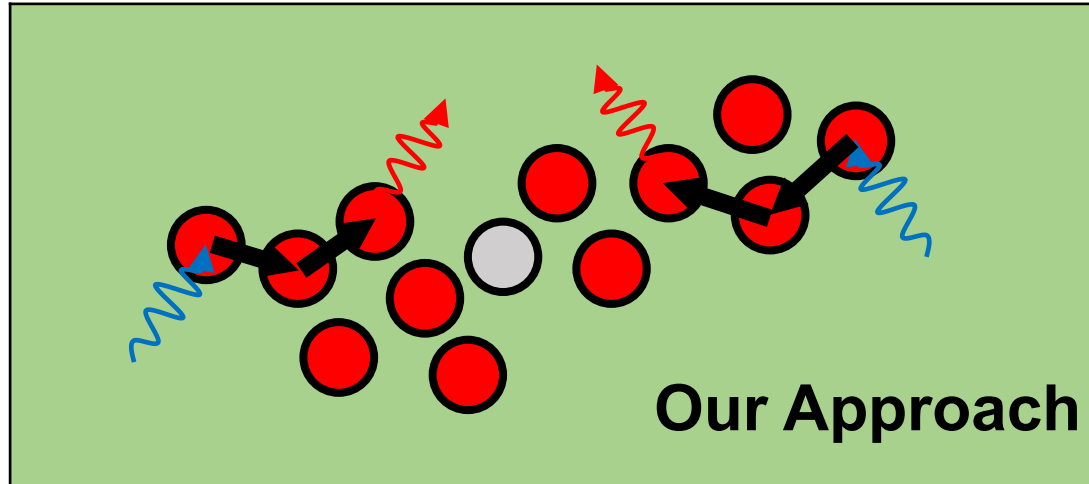
Energy Transfer

HIGH

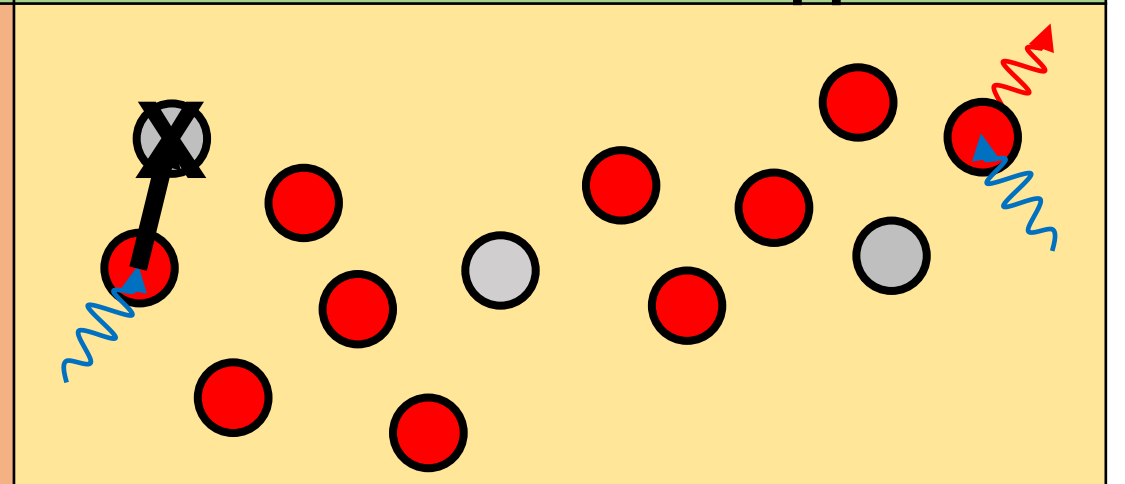
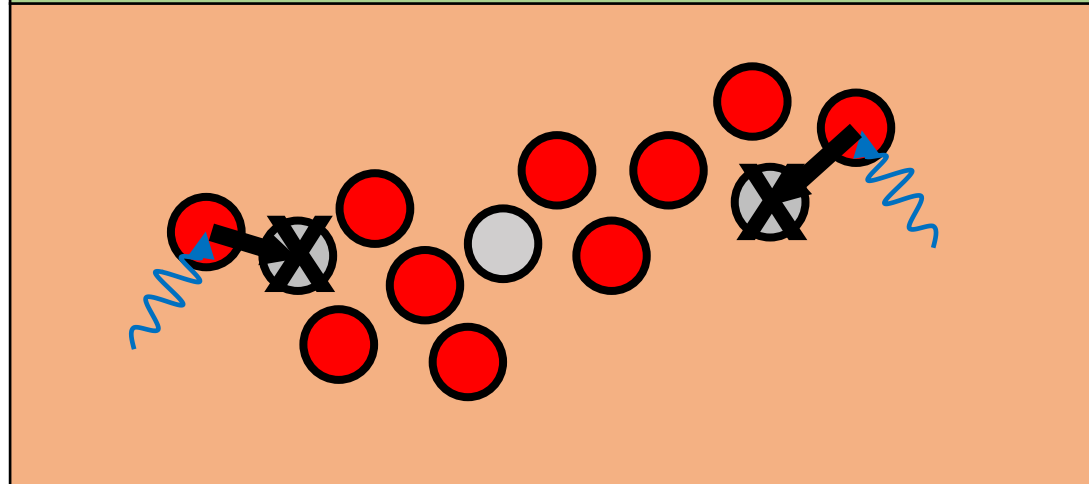
LOW

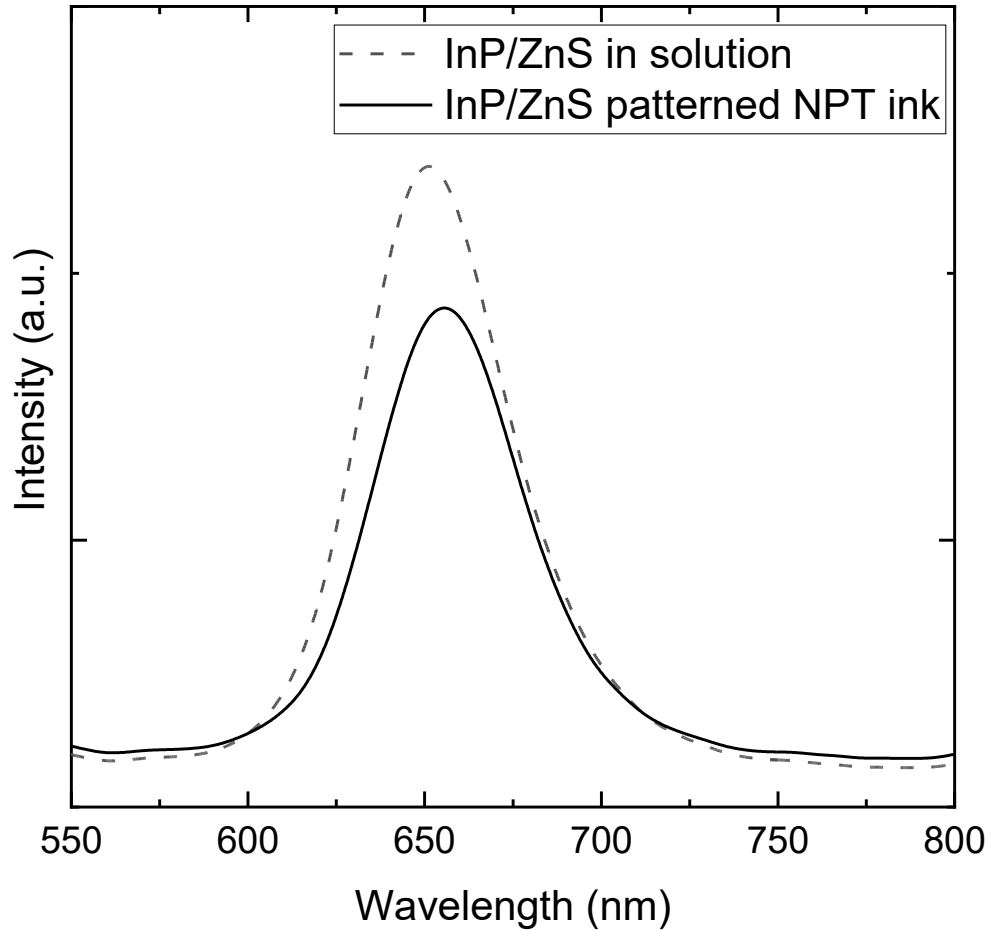
Starting Solution PLQY

HIGH



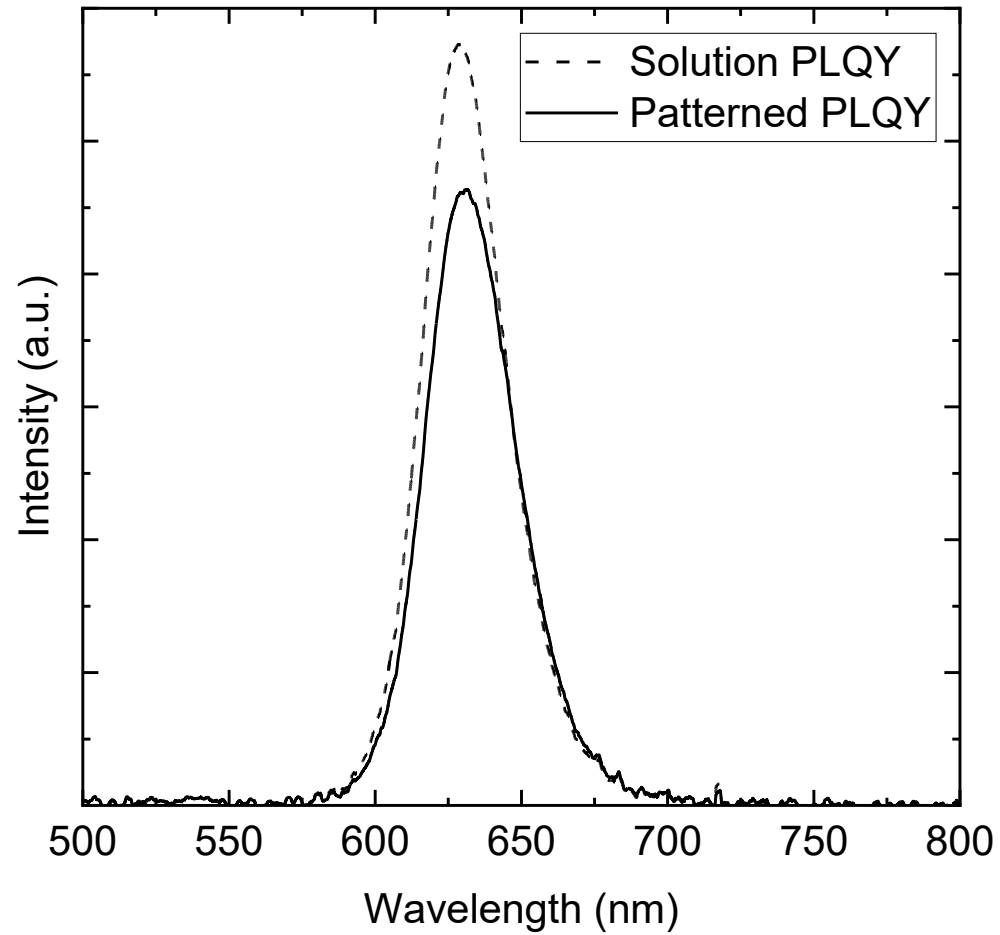
LOW





Currently, we can preserve
72%
Of solution QY in a dense InP/ZnS film
And we have a plan moving forward





In CdSe systems

75%

Absolute PLQY

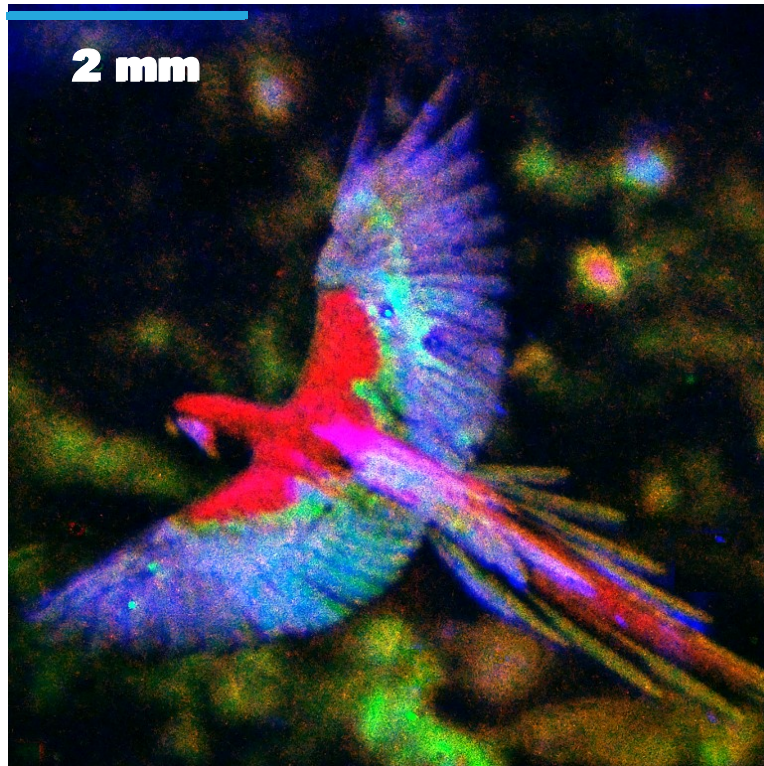
Higher Quality source QD

=

Better PLQY Preservation



Summary



- 5 μm resolutions demonstrated at OD=2
- High QY can be preserved at high packing densities with the right engineering controls





Yu Kambe, PhD.
CEO, Co-Founder.



Dmitri Talapin, Prof.
Co-founder



Forrest Etheridge, PhD.
Senior Scientist.



Charles Magiera
Business Development



Nisa Zaheer
Technician



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TECHNOLOGIES **Team**



Jonathan Steckel, PhD.
Advisor



Danielle Chamberlin, PhD.
Advisor



Richard Schaller, Prof
Advisor

Support from:



SBIR PHI
Project # 1938442

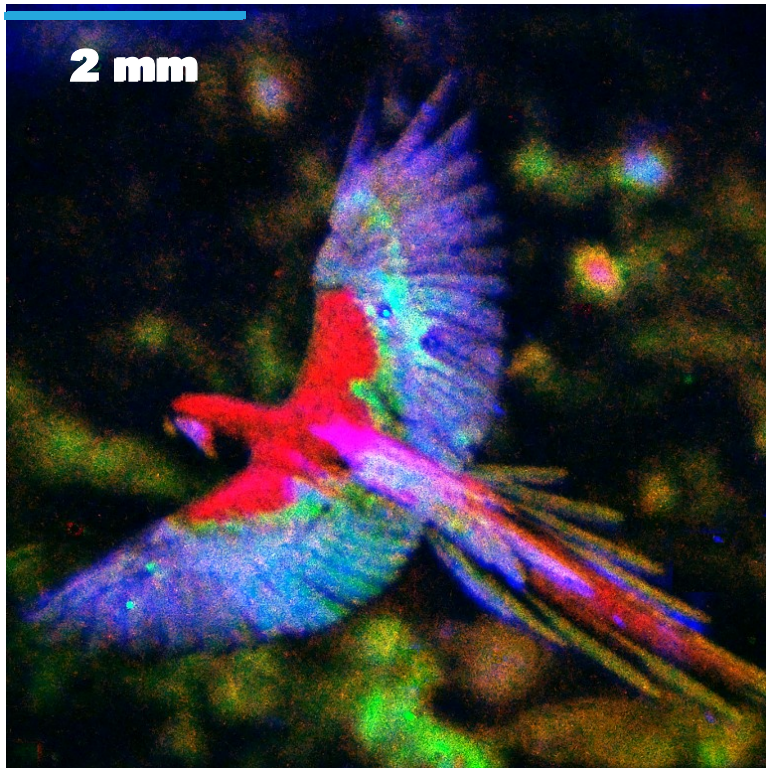


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Thank you!

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