

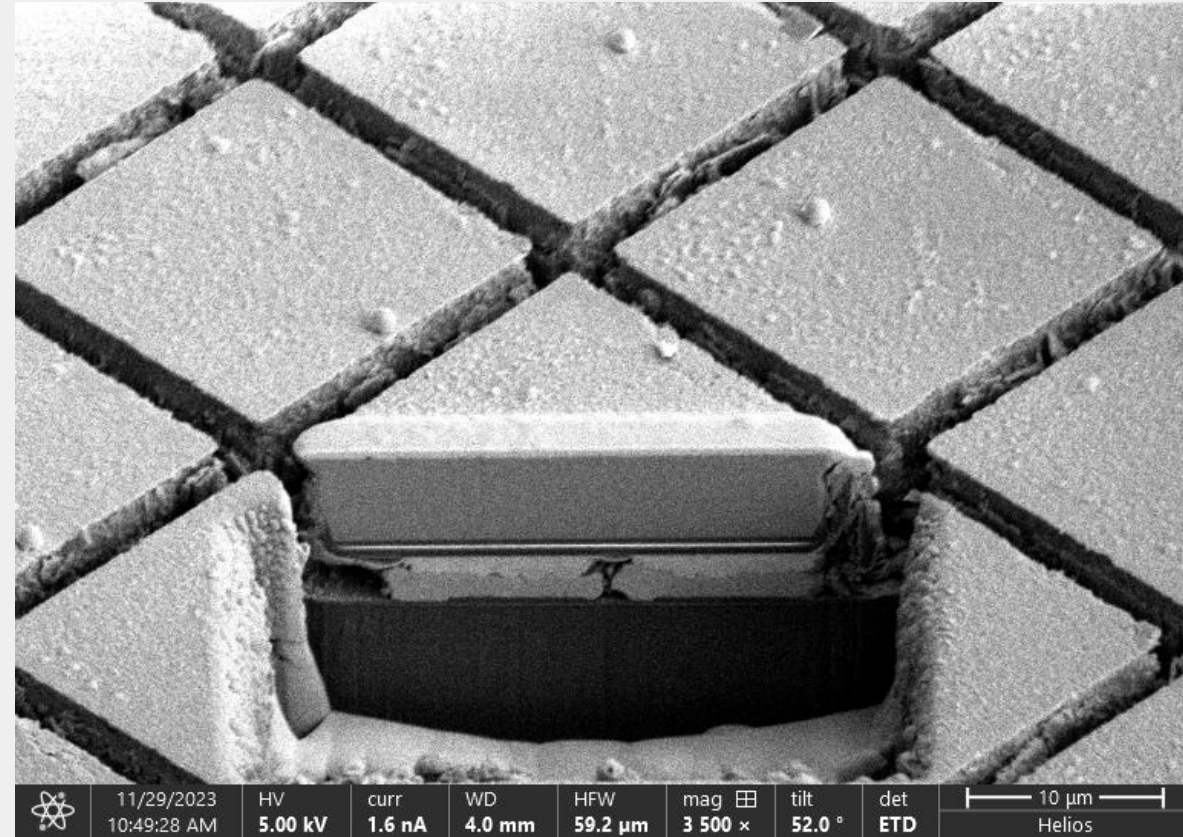


QubeDot



***SMILE microLED platforms
as customer-centric
display solutions***

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QubeDot GmbH
(co-founder & CTO)



	11/29/2023 10:49:28 AM	HV 5.00 kV	curr 1.6 nA	WD 4.0 mm	HFW 59.2 μm	mag 3 500 ×	tilt 52.0 °	det ETD	 10 μm Helios
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■ QubeDot

We:

- **Founded 2019**
- **45+ person years of development**
- **Unique technology to process GaN material system**
- **Passionate TEAM of ~15 employees**

The difference:

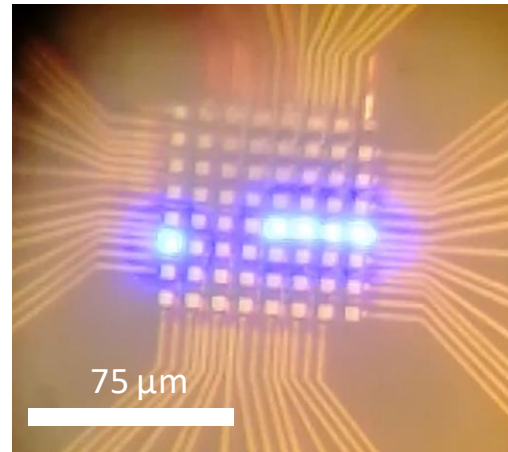
- **Big Players do not touch their standard processes and often do not think outside their box**
- **We understand the InGaN material system**
- **We are safe to provide any design from 1 ... 1000 μm !**
- **Customers receive their customized microLED solution even in small quantities within short lead times**



■ Monolithic approach: SMILE Platforms

- System with 16 x 16 pixels
- Standardized contact ring for different pixel sizes & pitches & wavelengths.
- 170 kHz frame rate

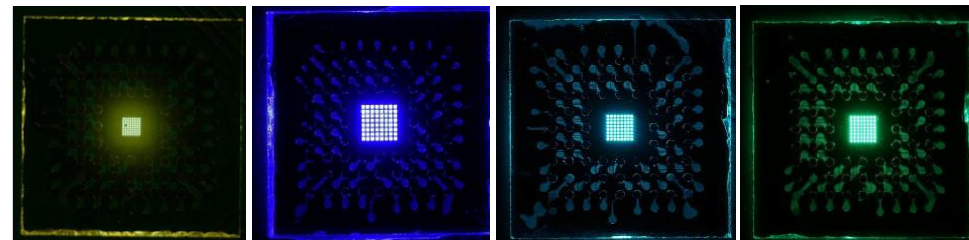
- System with 8 x 8 pixels
- Standardized contact ring for different pixel sizes & pitches & wavelengths.



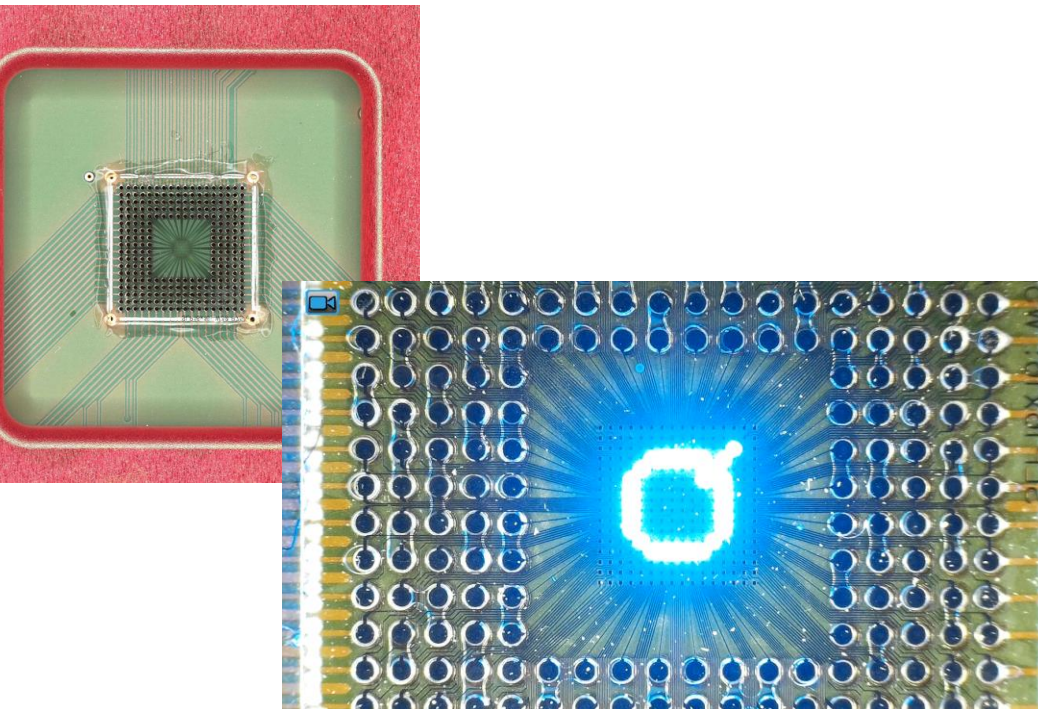
5 μm pixel size
5 μm distance.

Single pixel
modulated with
1kHz in this video.

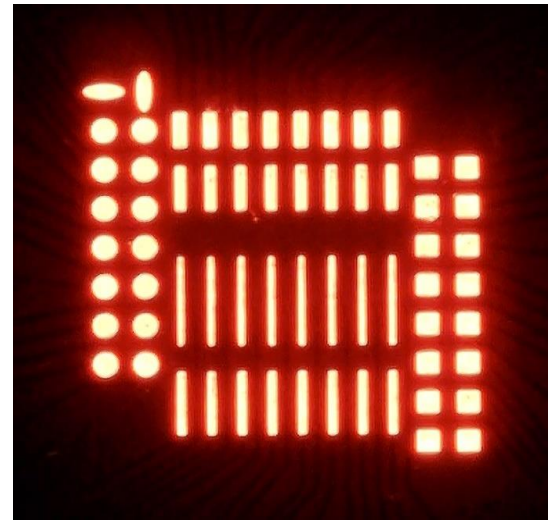
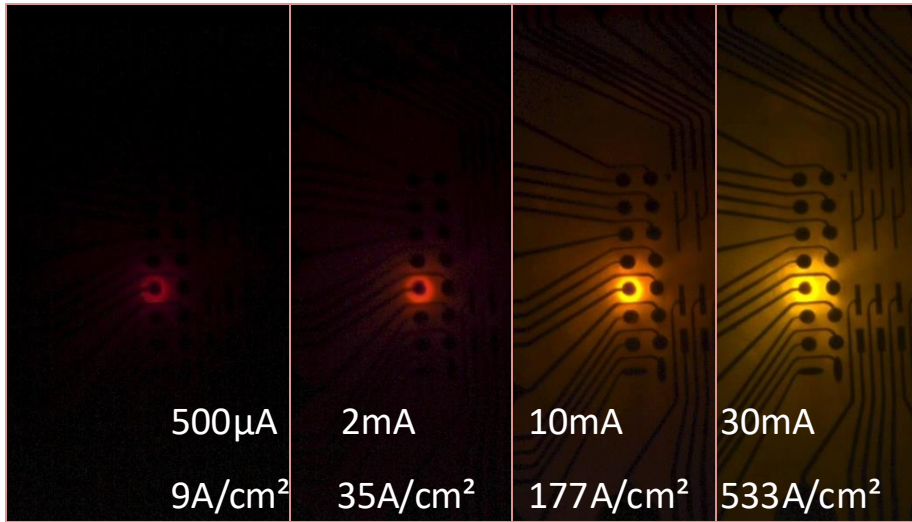
Too fast for camera.



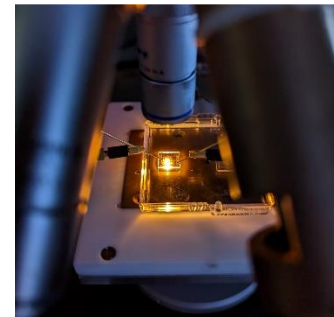
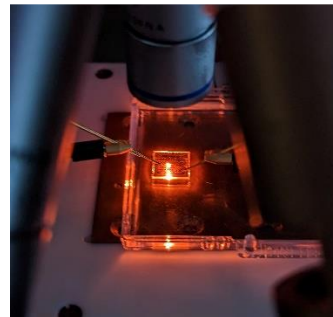
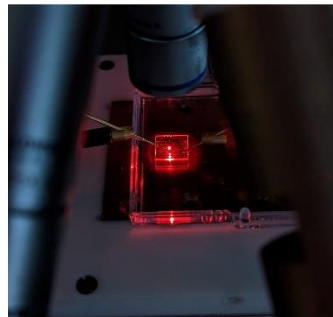
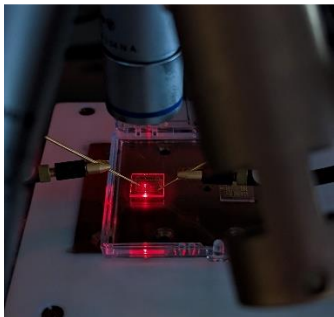
From UV to green of course...

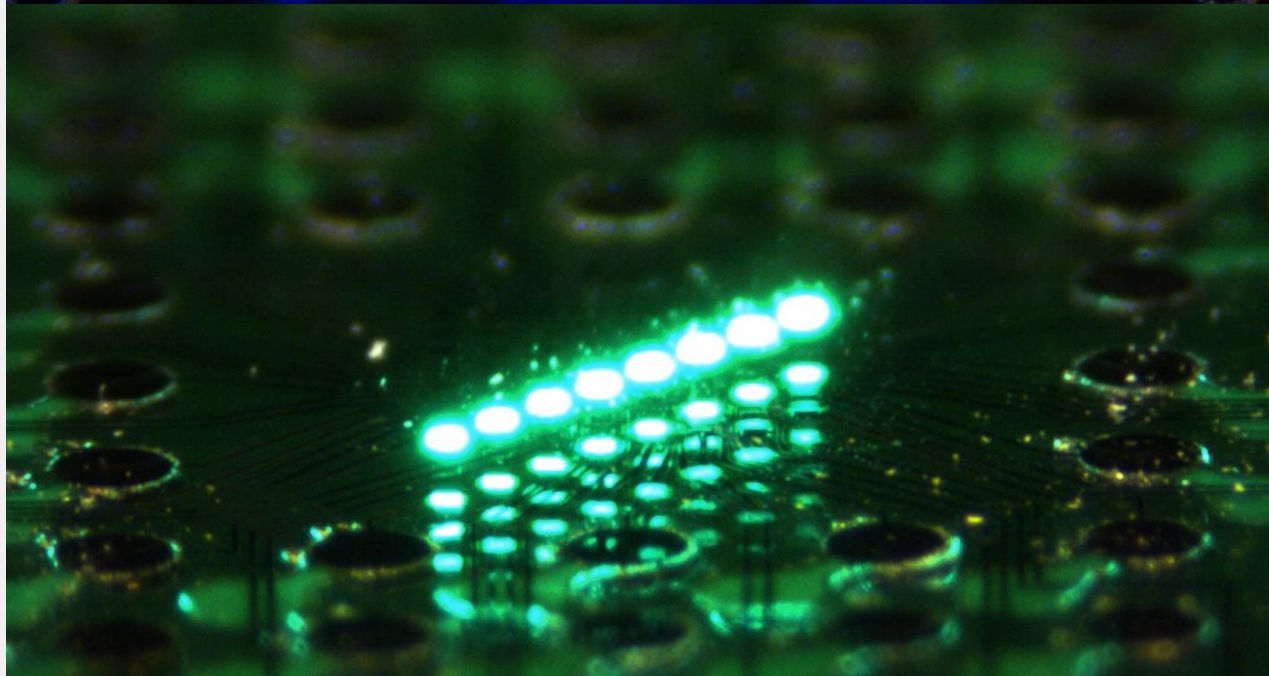
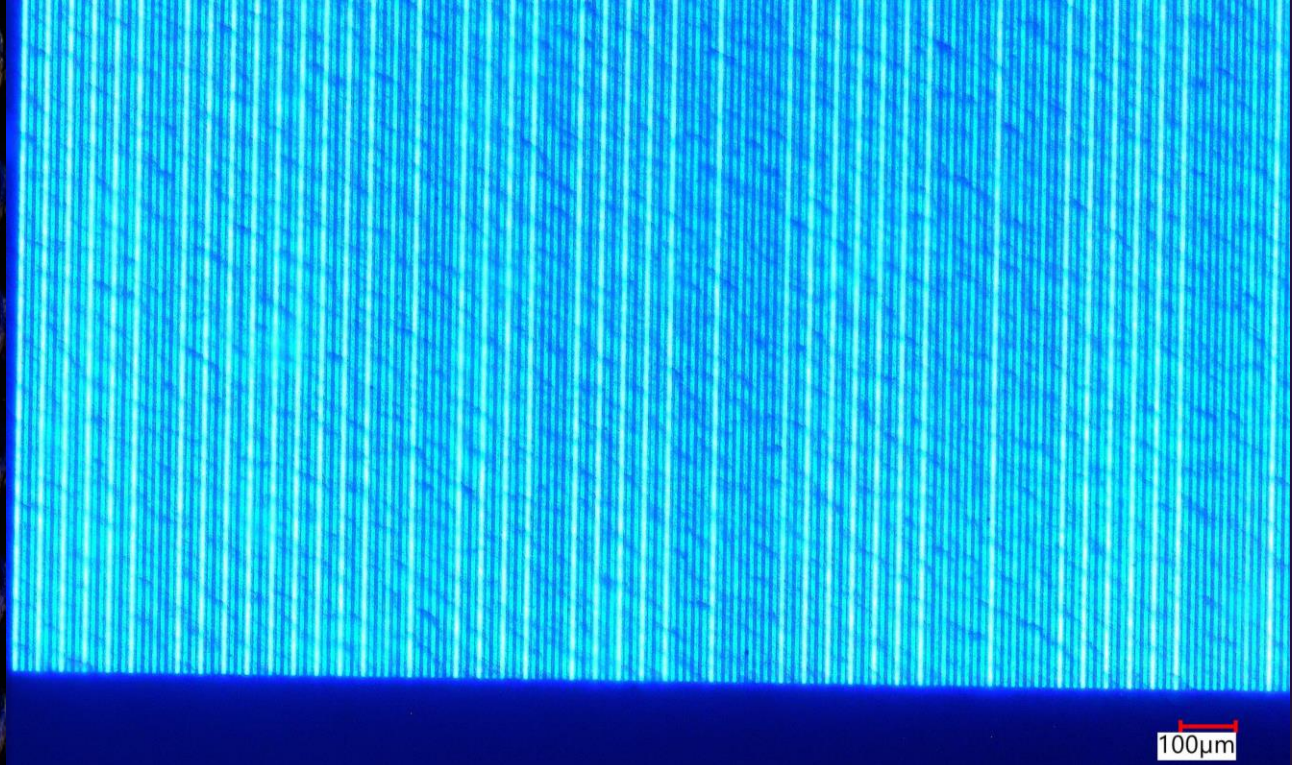


■ SMILE Platforms – Tuneable native red InGaN



- Red microLEDs with feature sizes down to 3 µm.
- Tuneable
- Can be adapted to customer designs with several emitters on a chip or distinct microLEDs on wafer





100 μm

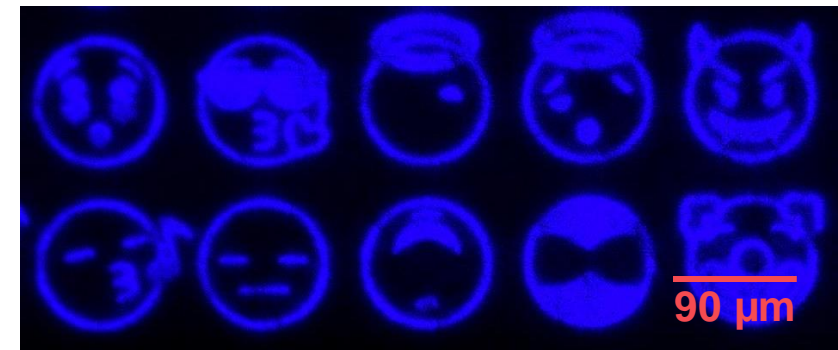
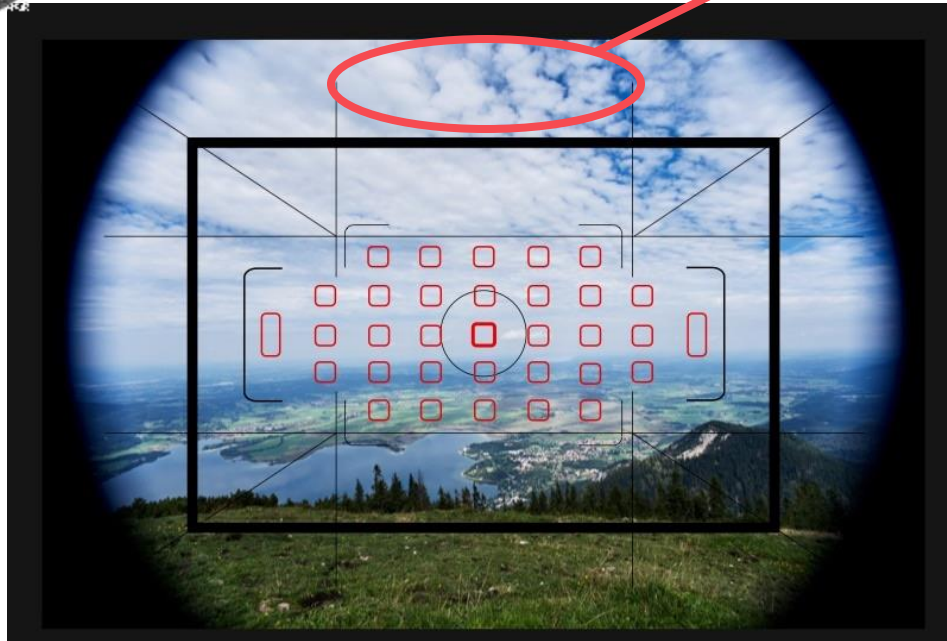


Qube

■ Example: Information displays



Place additional information **off-axis** by projection here on monolithic μ LED die with form-independent pixels



■ Our general take on “assembled” displays



Copyright: Yole presentation @ Techblick 2021

Die size

What about the efficiency in the low single-digit micron regime?

Yield/Repair

Better go for “first time right”!

Transfer

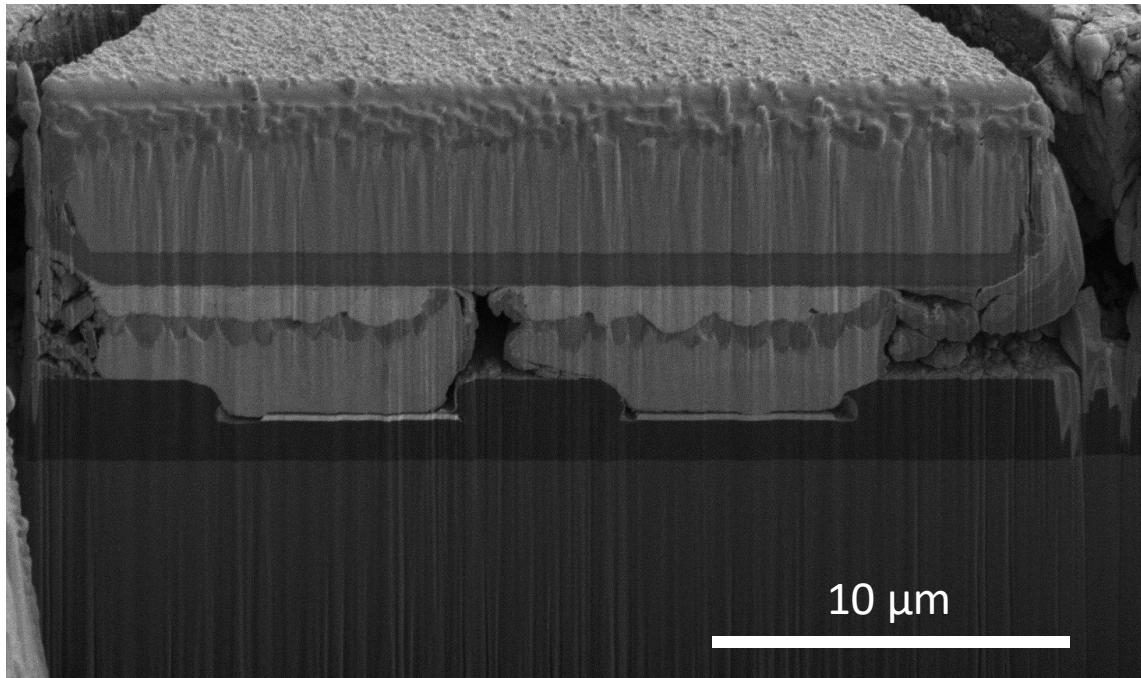
Which transfer mechanism is fast and reaches >> 99,9999% placement yield?



■ Transfer of μ LEDs

Best LED process is nothing without proper transfer tools.

Example 4K Display: 3840 x 2160 (pixels) x 3 (RGB) = 24.88 million microLEDs.
99,99% successful transfers
→ Still 2489 dead pixels...



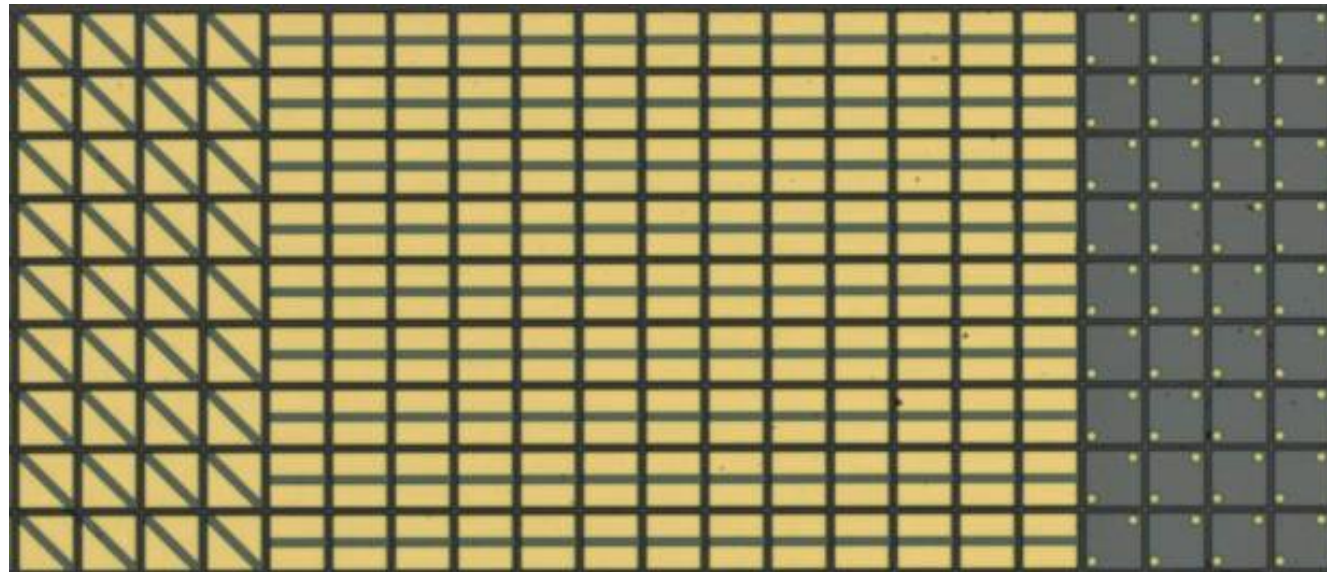
We perform and offer

- LLO after bonding or
- LIFT for direct μ LED transfer+bond

■ Towards standardization of μ LED-dies

Potential size of

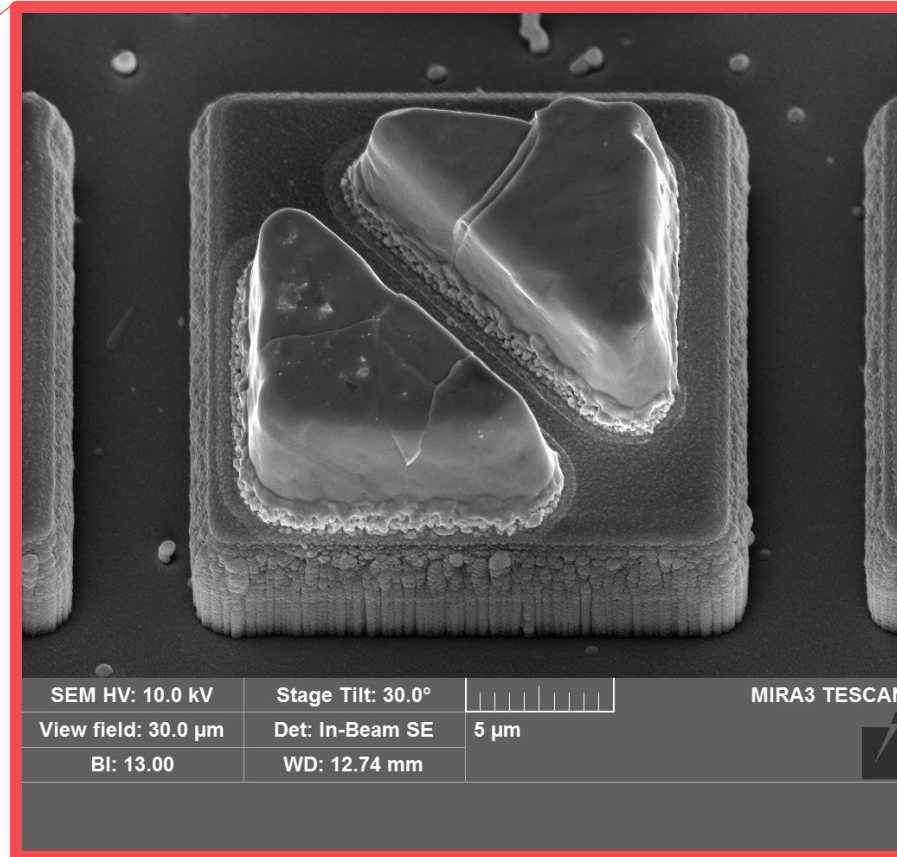
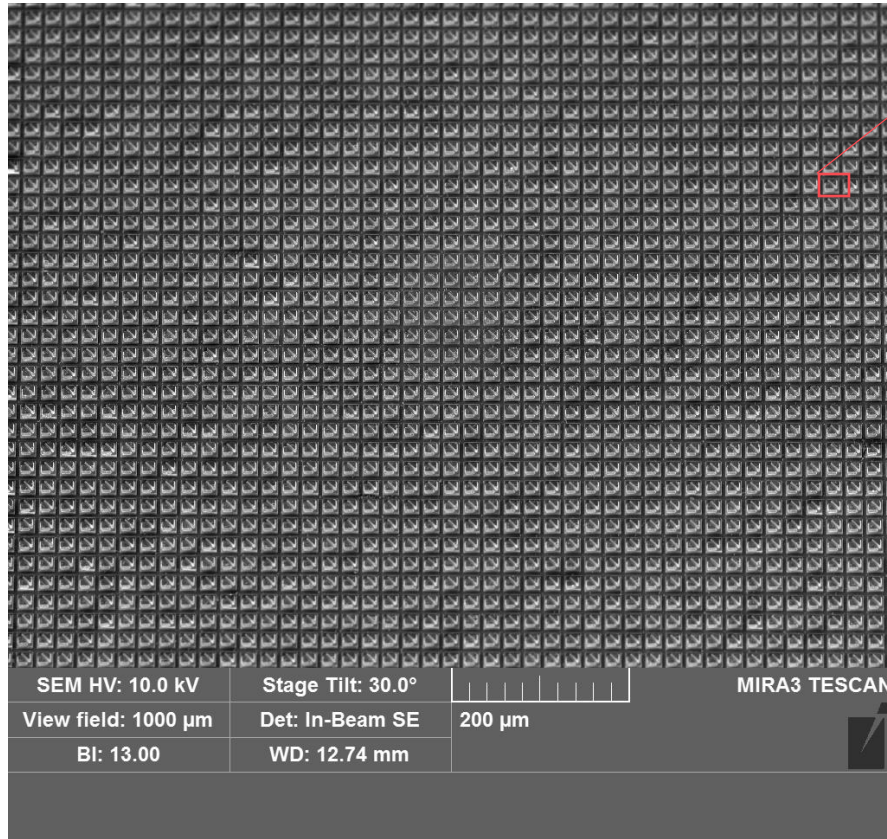
- Die 14 // 20 // 40 // 80 // + μm
- Contact pad 5 ... 40 μm – any shape
- Emitter 2 ... 75+ μm



Dies with size 80 x 80 μm^2 with different contact pads. Ready for transfer.

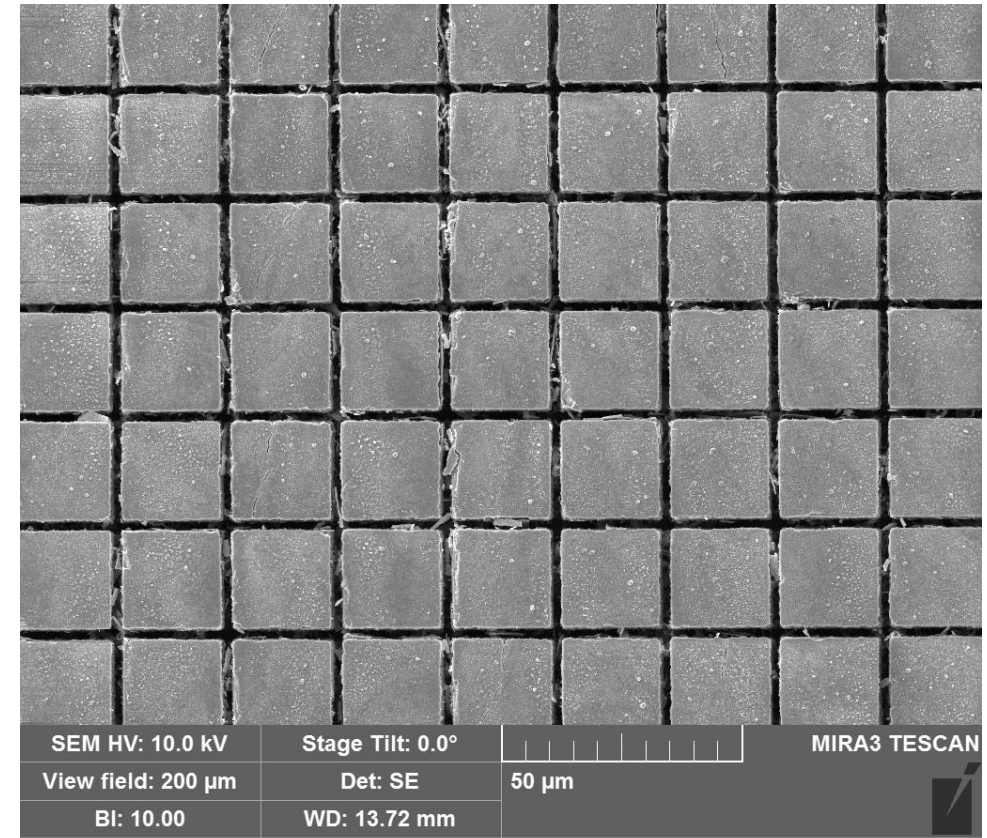
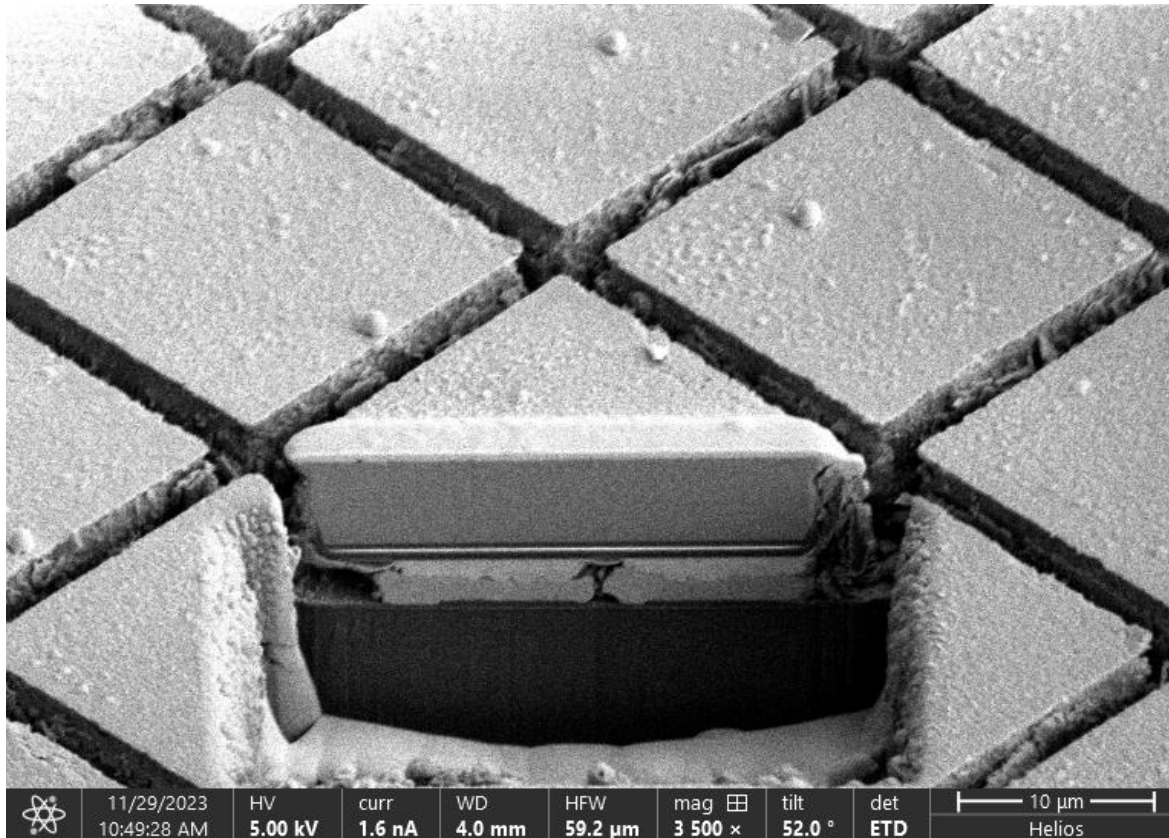
No “golden way” yet in the microLED industry. Standards regarding die sizes, contacts, and emitters have huge benefits at the interfaces of all industry players.

Towards standardization of μ LED-dies



Die size 14 x 14 μm^2 .

■ Towards standardization of μ LED-dies

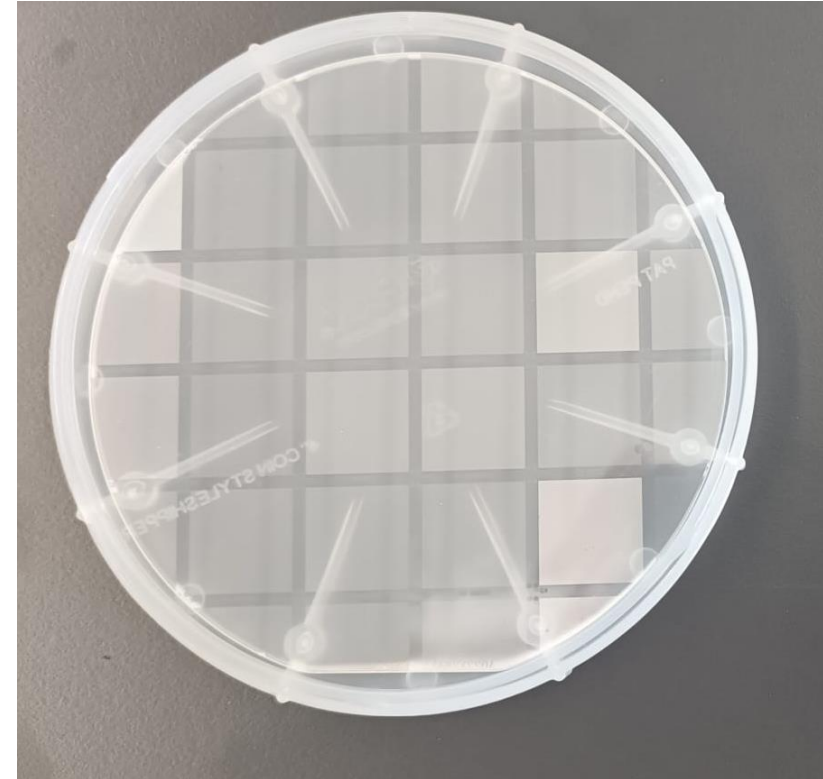


Die size 14 x 14 μm^2 .

■ We deliver your μ LEDs GaN-on-Sapphire

Proposed standard die geometry:

- Die
 - 10 x 10
 - 20 x 20
 - 40 x 40 μ m
- Pad size:
 - margin 1/10 of die size
 - spacing 2/10 of die size
- Emitter
 - 8/10 of die size (die size dependent)



... and perform the transfer with our toolbox.

■ Your personal contact

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Stay **connected**

