



# Reflector cavity packaging for UV LEDs

Dr. Ulli Hansen – CEO

The image shows a promotional graphic for an EPIC meeting. The top half features the EPIC logo (three colored circles: blue, green, red) and the text "EPIC European Photonics Industry Consortium" in white. The background is a dark purple image of a UV LED chip with bright purple light spots. A red banner at the bottom contains the meeting details in white text.

**Monday, 22 June 2020, 15:00 CEST**  
EPIC Online Technology Meeting on  
UV-LED-based Technologies and Applications

# Lithoglas – Company Overview

## Brief Company History

- Germany based company, Founded in 2006
- Headquarters and Production in Dresden
- R&D Cooperation in Berlin
- ISO 9001 certified since 2011



## Purpose:

- Develop and commercialize innovative wafer level packaging technologies for enabling miniaturized SMD or COB-type packages



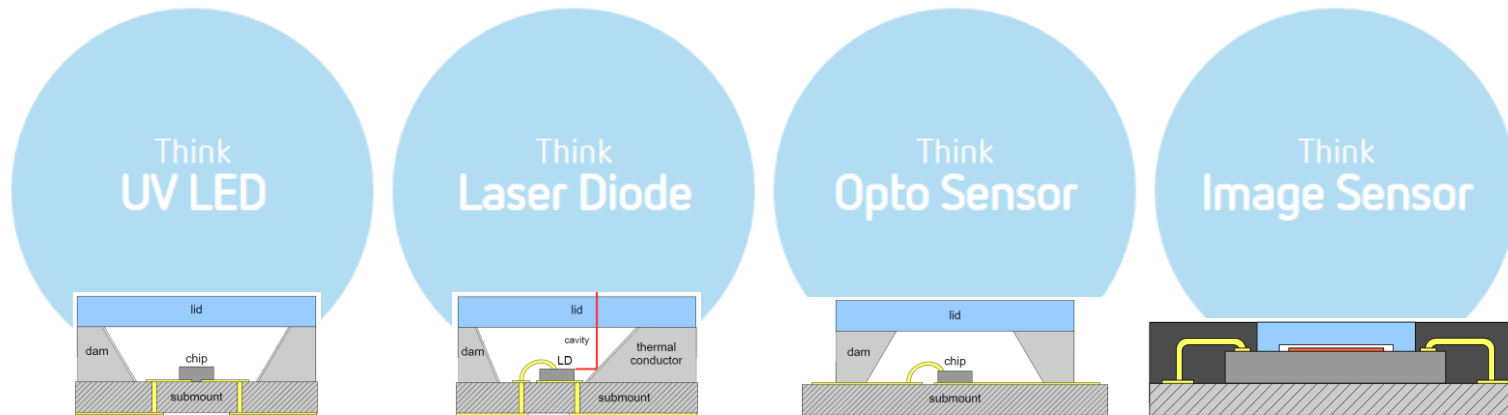
## Application Focus:

- Opto-Electronic Packaging and MEMS

# Lithoglas – Company Overview

Lithoglas – Specialist in advanced opto-electronic packaging

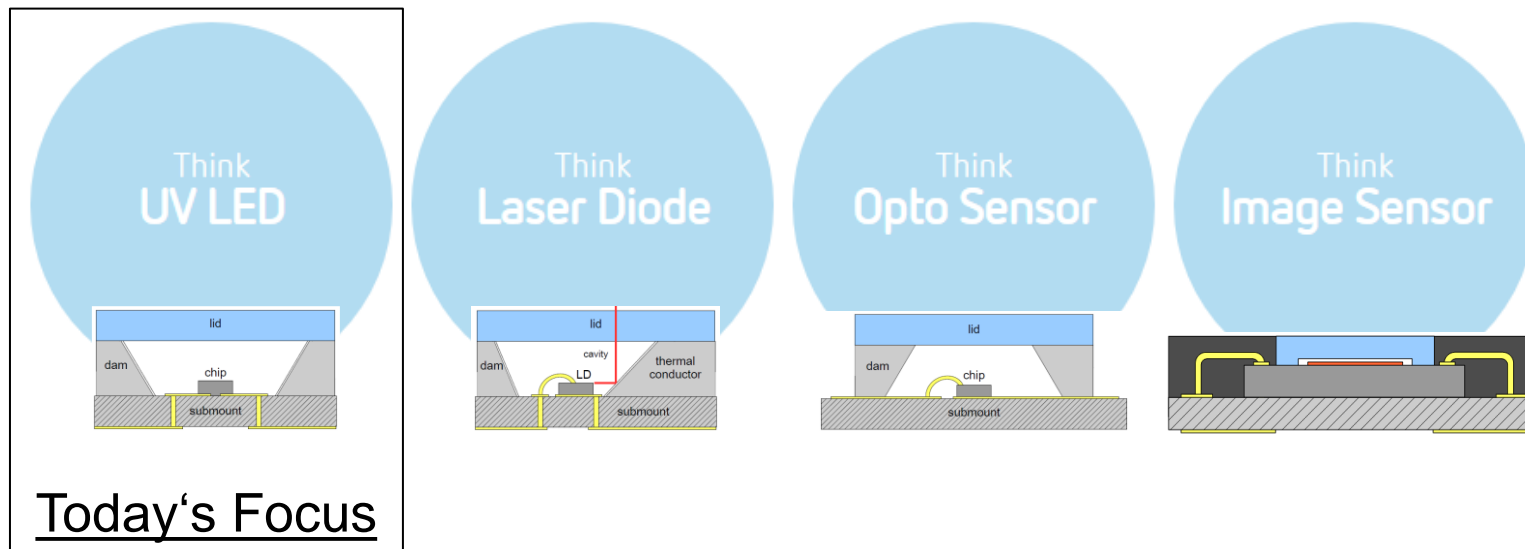
- Enabling Miniaturized, Hermetic, SMD-/COB-compatible Packages
- Enhancing Optical Performance
- Excellent precision due to semiconductor processing techniques
- High scalability by wafer-level processing
- Focus on Emitter and Sensor Packaging for:



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# DUV LED – Current Packaging

## TO – package

- hermetic, welded package
- large, cumbersome mounting
- integration of lenses possible
- suitable for lower volumes



## SMD ceramic packages

- 3D-structured ceramic / through contacts to back
- hermeticity possible, quartz lid e.g. attached by AuSn soldering

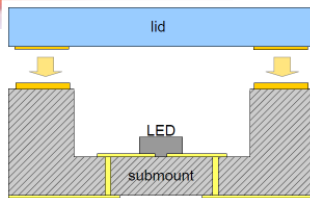
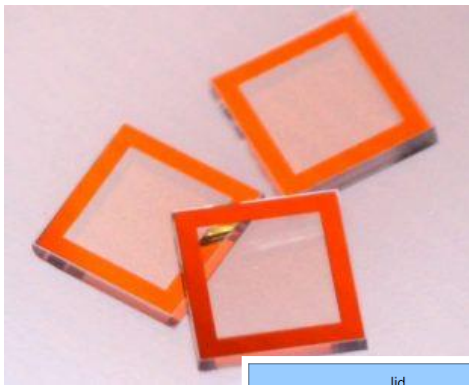


Examples from the internet

# DUV LED – Lithoglas solutions

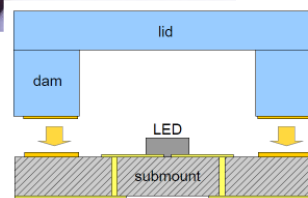
Our offerings for SMD-type packaging of UV-LEDs

## Flat Windows



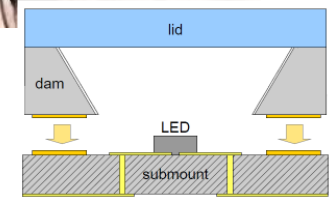
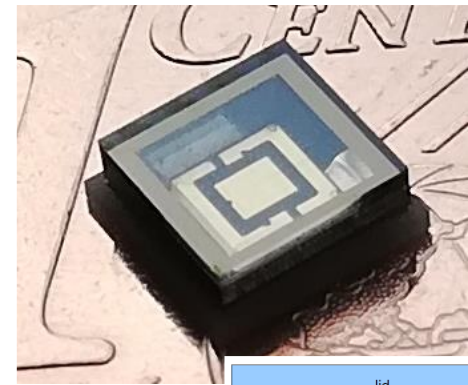
- Drop in solution for current packages
- Silica lid
- High performance AR coatings
- Solderable metallization

## Silica Windows



- Allows use of flat submount
- Transparent sidewalls
- 3D-structured silica cap
- High performance AR coatings
- Solderable metallization

## Reflector Windows



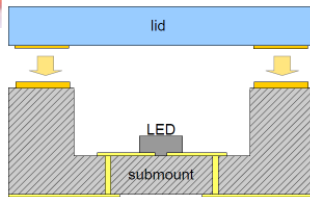
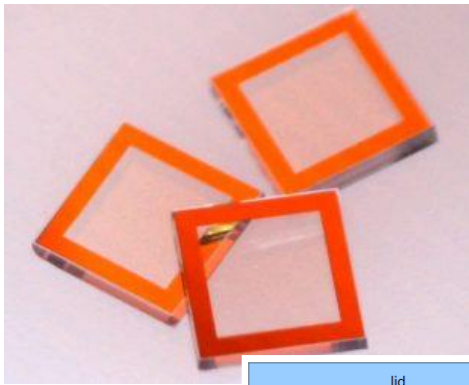
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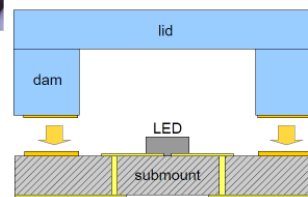
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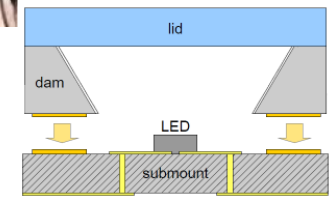
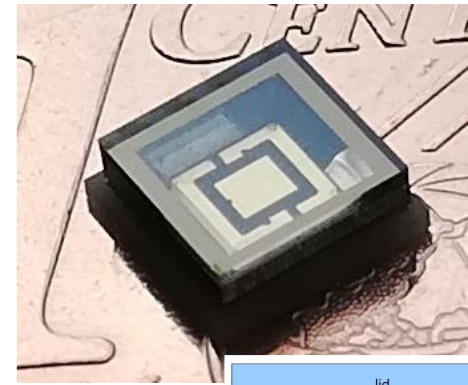
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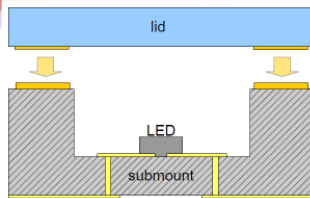
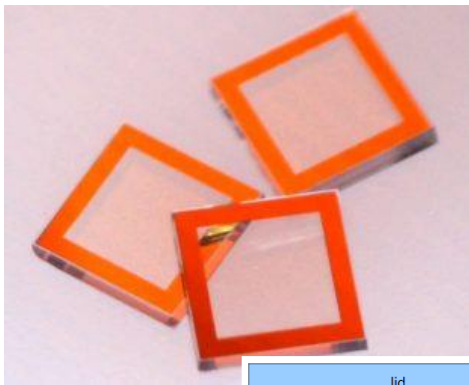


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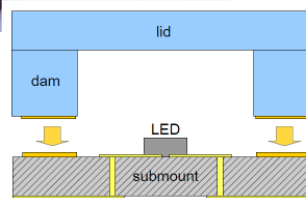
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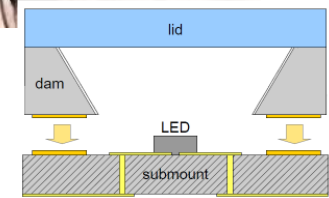
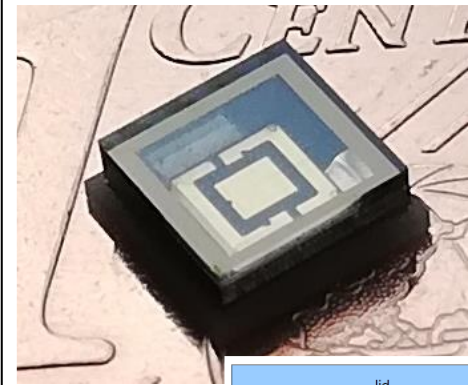
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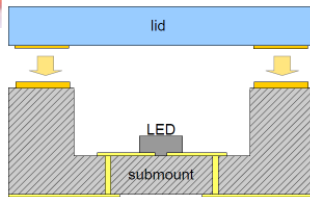
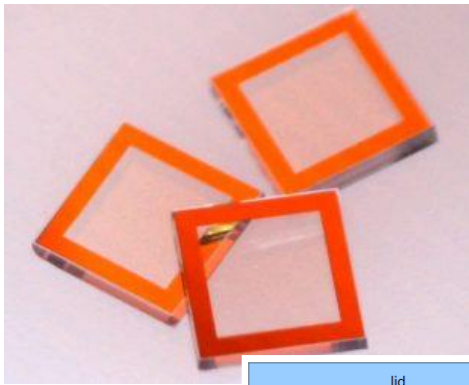
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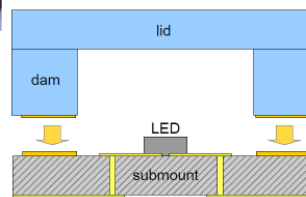
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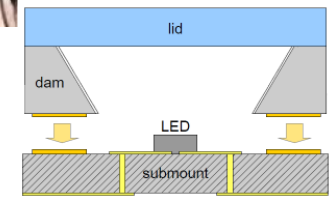
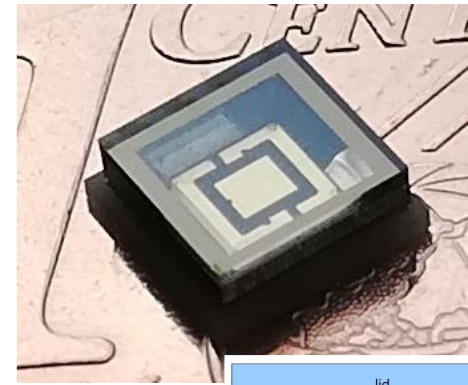
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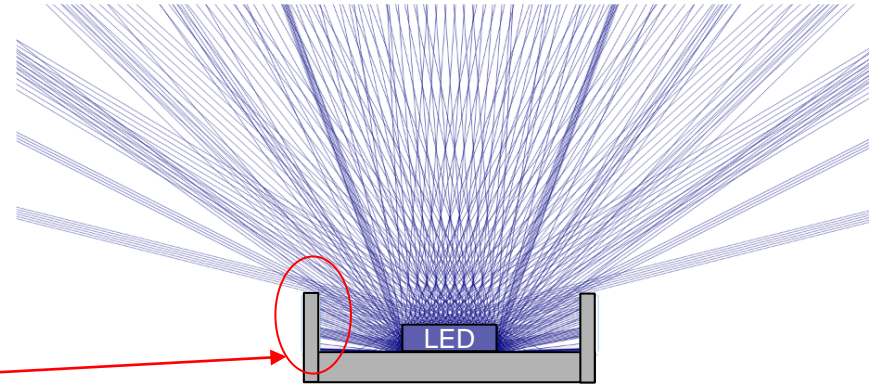
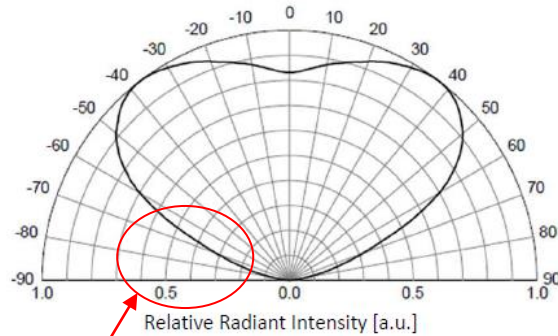
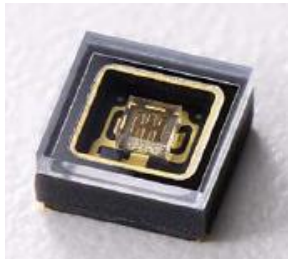


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# DUV LED – Light Output

Radiation pattern:

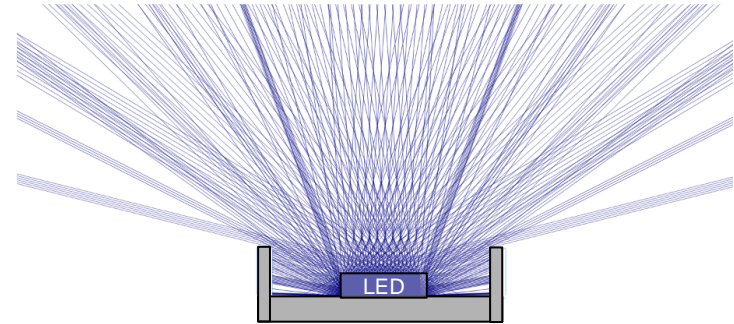
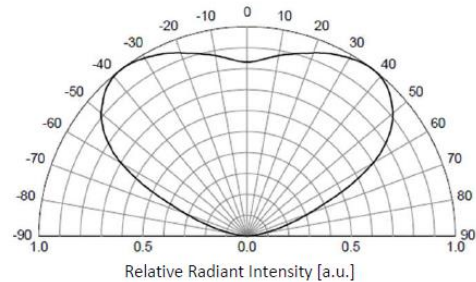
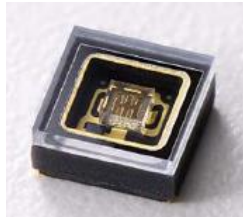
- LEDs emit a significant amount of light towards the side



- Large amount of generated light is lost at the side walls of the package

# DUV LED – Light Output

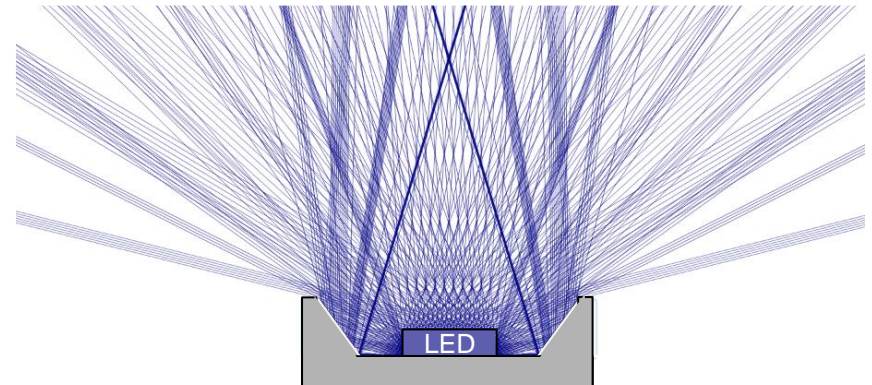
Radiation pattern:



➤ reflector allows to redirect side-emitted light to the top

➤ Higher output power!

➤ Comparison measurements to bare LED on submount (no lid) show that about 97% of the light is emitted by the reflector package



➤ Better thermal performance!

➤ Less light is lost in the sidewalls, less light is reflected back onto the LED

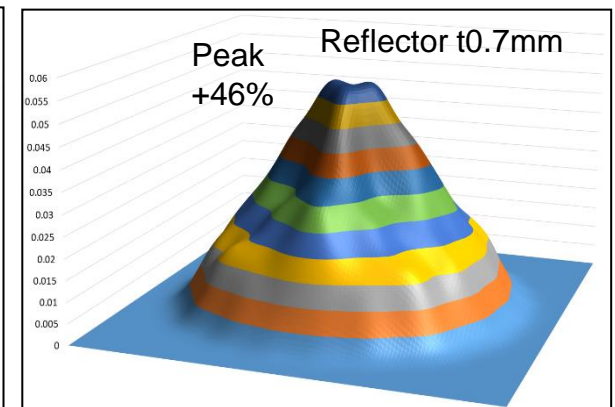
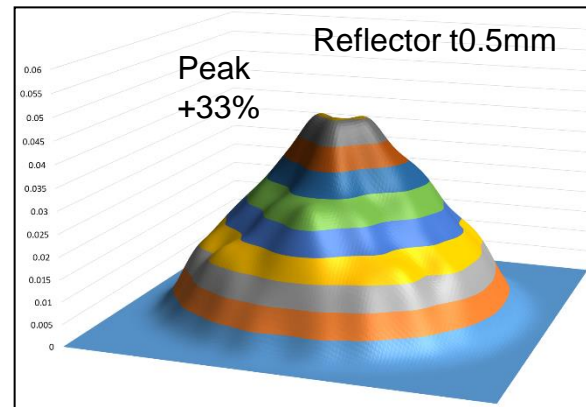
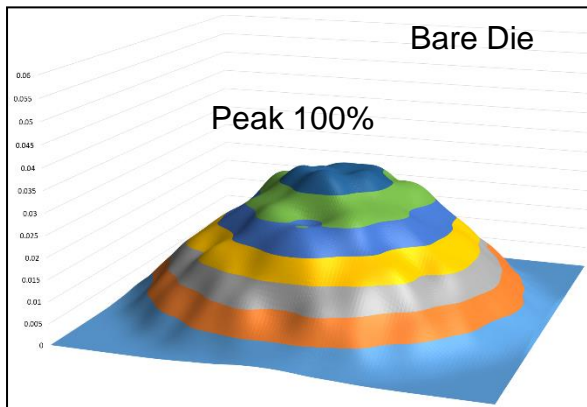
➤ Less heat generated in the package: LED current can be increased for higher light output

# DUV LED – Light Output

## Design Options:

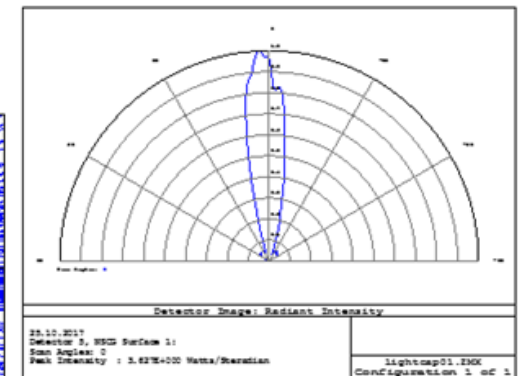
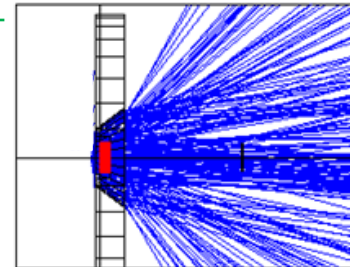
- reflector height allows to center the light pattern

Radiant Intensity (simulated):



- simulations show:  
lens-type emission pattern can be achieved  
maintaining a flat window surface!

- evaluation work on-going

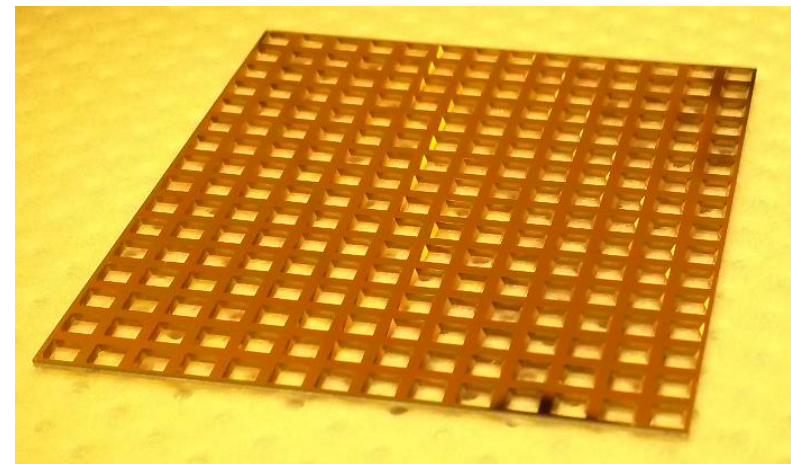
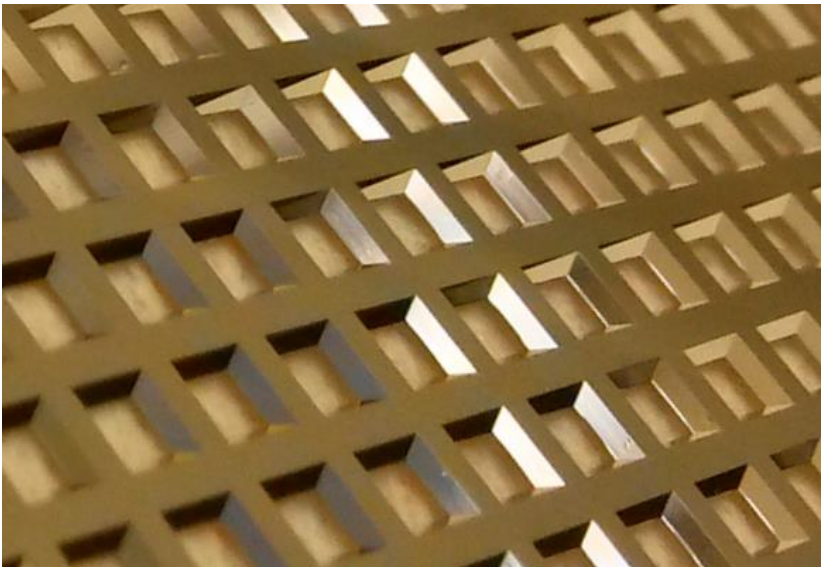
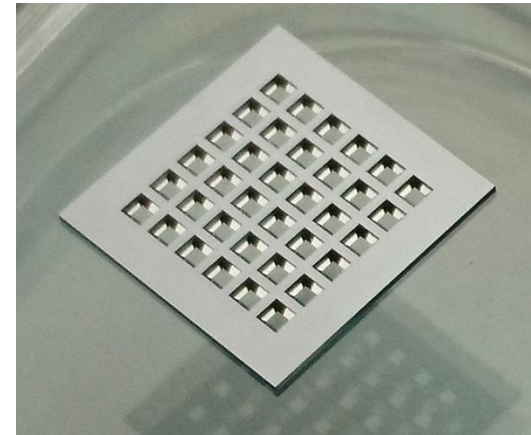




# DUV LED – Reflector Arrays

## Lithoglas array package

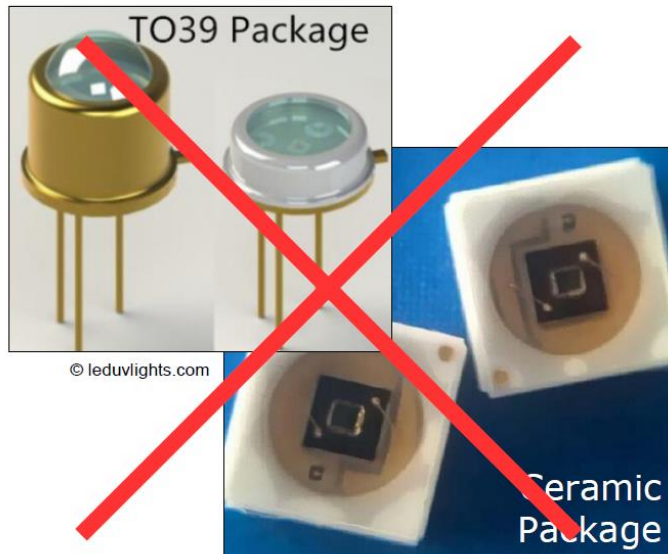
- cap array can be integrated in single package
- each LED with individual reflector
- optical insulation of single LEDs
- improved optical and thermal performance
- customized sizes feasible



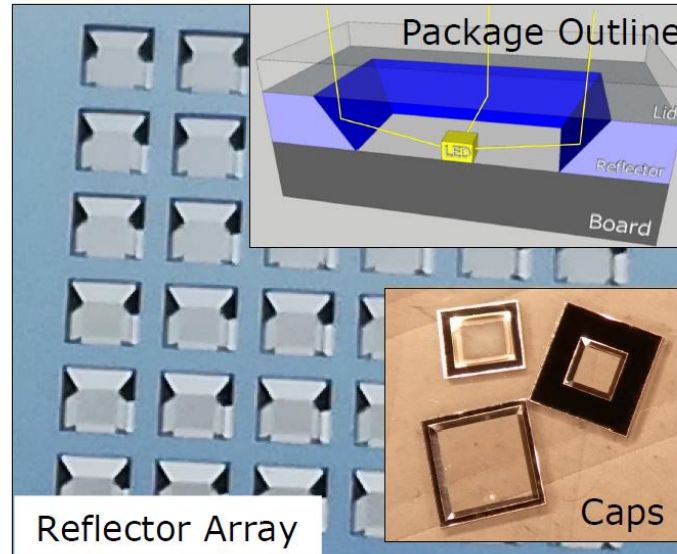


# Summary

## Conventional Packages



## Lithoglas Package



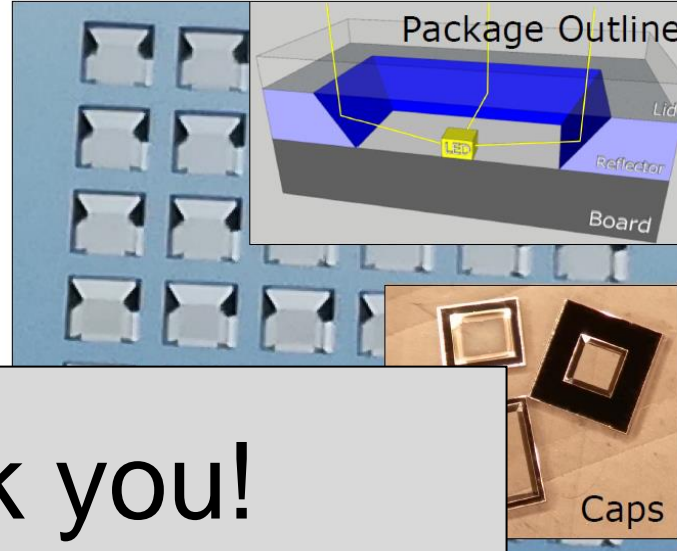
- high light output by integrated reflector
- good thermal performance
- hermeticity possible, fully inorganic materials
- customized package outlines and arrays possible
- integration in standard 3535 packages possible

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## Conventional Packages



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Thank you!

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