EVG® LED Exposure Optics

Mask Aligner Option

Introduction

EVG has been evaluating LED technology since 2005. At that time, UV-LED technology still faced some limitations for manufacturing purposes. In 2016, EVG re-launched its UV-LED lamp house setup as UV-LED technology advanced significantly and overpassed standard mercury light source in many aspects.

UV-LED technology gives its users much more flexibility for their applications in terms of UV exposure spectrum setup, as spectral lines are individually tunable and special optical filters are no longer required. Furthermore, low-energy consumption and long lifetime are among the UV-LED light source's advantages, as no warm-up or cool-down phase is required. In addition, LEDs need to be powered only during the exposure process, and the technology eliminates the need for additional facility (exhaust, cooling gases) and lamp changes, which are regularly needed for mercury arc lamps. This ideal combination not only minimizes running and maintenance costs but also adds value with improved operator safety and environmental friendliness. Mercury and its compounds are highly toxic to humans and the environment; therefore, special obligations have to be followed such as trained personnel, safety protective equipment for installation, replacements and handling, as well as storage and hazardous toxic waste disposal. The latest UV-LED technology secures safe operation, meaning no risk of toxic exposure during the regular mercury arc lamp installation, replacements or handling.

GREEN PROCESS

The European Union is moving toward a mercury-free economy and thus issued a regulation [2017/852], which forbids production, import and export of high-pressure mercury vapor lamps for lighting and special purposes as a first step. The United Nations (UN) organization addresses this environmental impact globally with the 'Minamata Convention on Mercury', where over 100 parties have already committed to follow this program.

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EVG®610 equipped with LED lamp house

Process performance

- Fast and easy process recipe transfer
- Broadband exposure spectrum (i-, g-, h-line)
- Equivalent system throughput performance
- Available on mask aligner platforms from R&D to HVM production line

Features

- Minimized operation costs
  - Without regular lamp replacements
  - Clean and sealed lamp house setup
  - Minimum facility requirements
- Minimized maintenance costs
  - Low power consumption
  - Long life-time
  - Instant on / off
- Spectrum lines are individually tunable
  - No additional costs for filters
  - Consumables-free
  - No more contamination of the optics
  - Recipe controllable wavelength intensity settings
- Green process
  - Mercury-free, Ozone-free
  - No hazardous operation and toxic waste disposal

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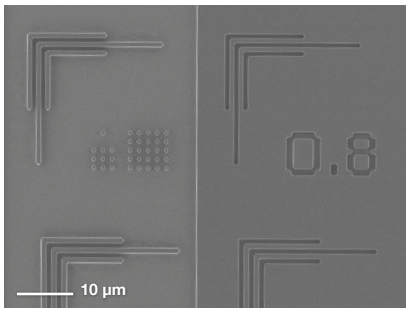
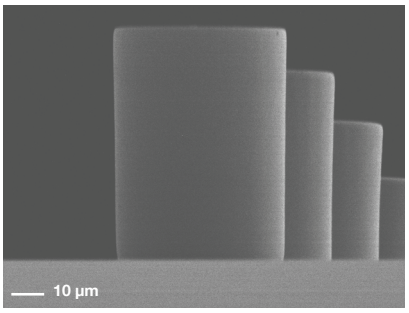
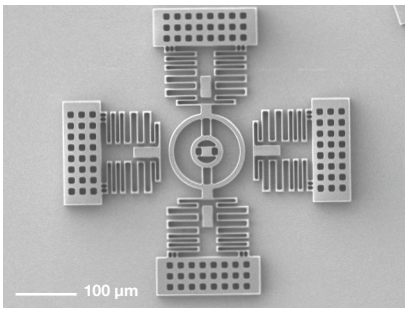
Process Results



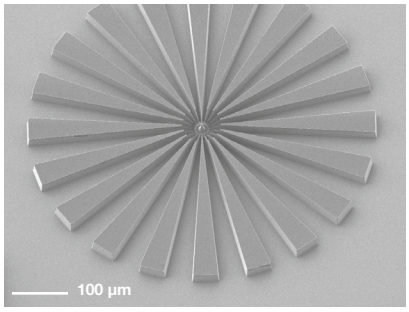
Vacuum contact exposure, chemically amplified positive thin film resist
Source: EVG



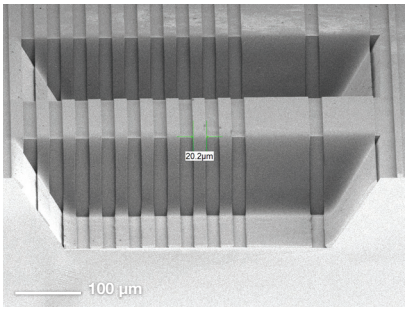
50 µm thick SU-8 exposed pillars, sidewall angle 90° +/- 0.5° utilizing optimized exposure & process methods
Source: EVG



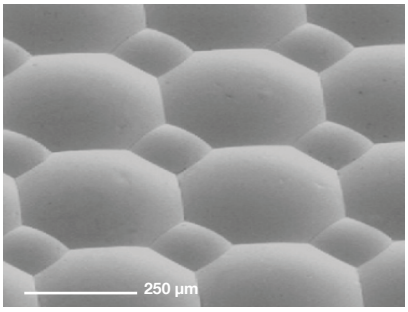
MEMS structures patterned in 20 µm thick resist
Source: EVG



Siemens star showing high-resolution capabilities for thick resist patterning
Source: EVG

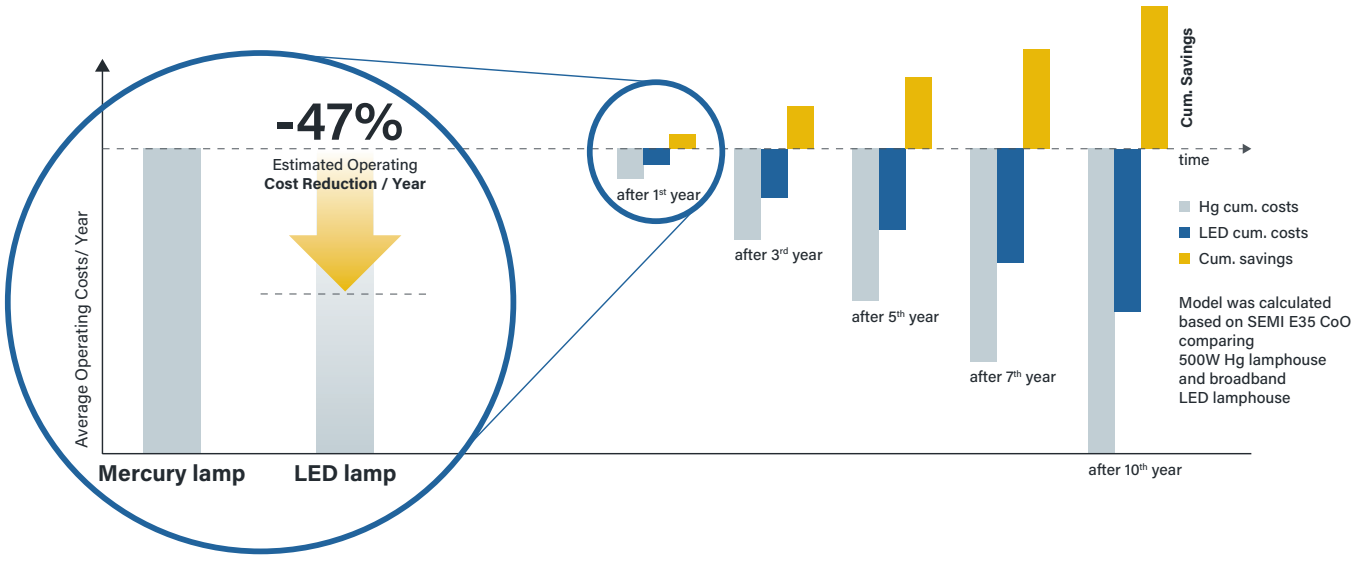


High depth of focus exposure of KOH etched cavities with a depth of 150 µm
Source: EVG



Imprinted microlenses using SmartNIL® technology with UV-LED light source
Source: EVG

Operating Costs Comparison



Get in touch:

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