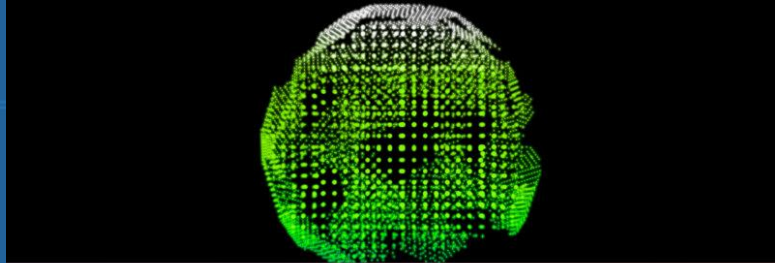


EPIC Online Technology Meeting on Metamaterials and Metalenses

Metalens Manufacturing using Nanoimprint Lithography

09.January 2023 | Patrick Schuster – Process Technology Engineer SmartNIL® R&D



09 January 2023, 15:00 - 17:00 CET

EPIC Online Technology Meeting
on Metamaterials and Metalenses



Leading supplier of wafer processing equipment for the nanotechnology, MEMS and semiconductor markets

Founded in 1980 by DI Erich and Aya Maria Thallner. More than 1200 employees worldwide

Headquarters in Austria, with fully owned subsidiaries in the USA, Japan, South Korea, China and Taiwan

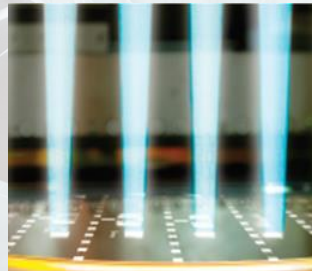
Recent Developments



EVG®850 DB
Laser Debonding



BONDSCALE™
Fusion Bonding



EVG® MLE™
Maskless Exposure
Technology



EVG® HERCULES® NIL
SmartNIL® UV-NIL
Up to 300 mm

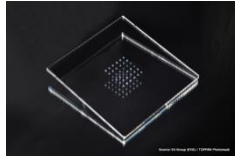


EVG® 770 NT
S&R NIL System

EVG Nanoimprint Lithography | S&R Mastering to Wafer Level Imprint



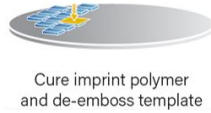
Single DIE Master



TOPPAN
TOPPAN PHOTOMASK



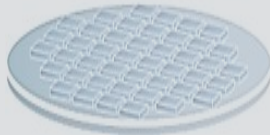
EVG[®]770 S&R System



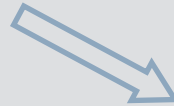
S&R Master



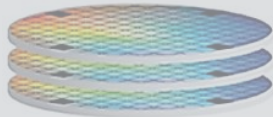
Working Stamp



S&R Master



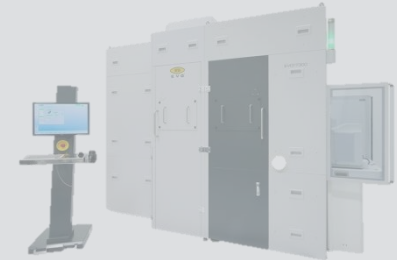
Multiple Imprints



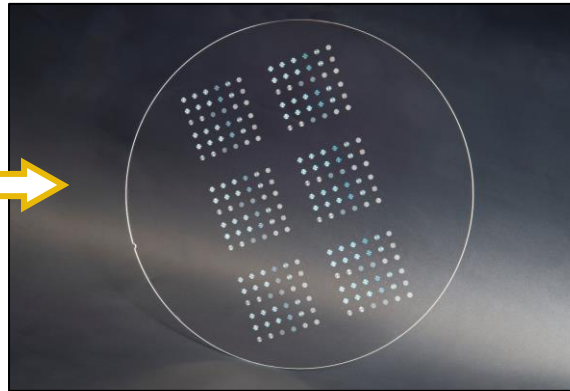
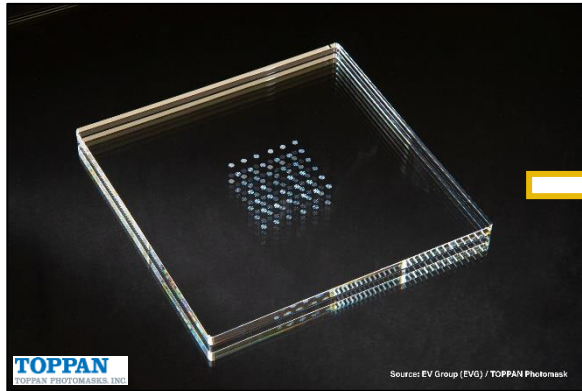
SmartNIL[®] Imprint



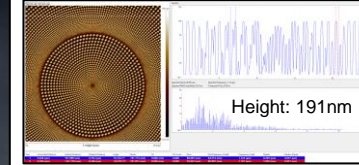
EVG[®]7300 SmartNIL[®] Module



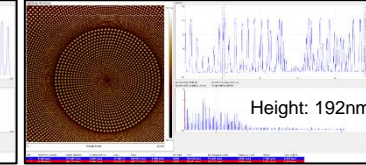
EVG[®]770 NT Step&Repeat | Metalenses - Process Results



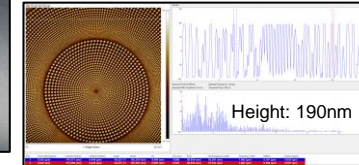
Die #1



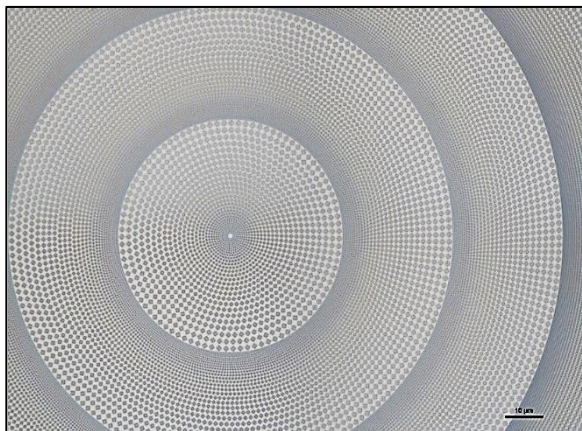
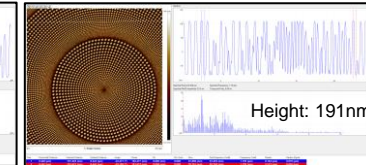
Die #3



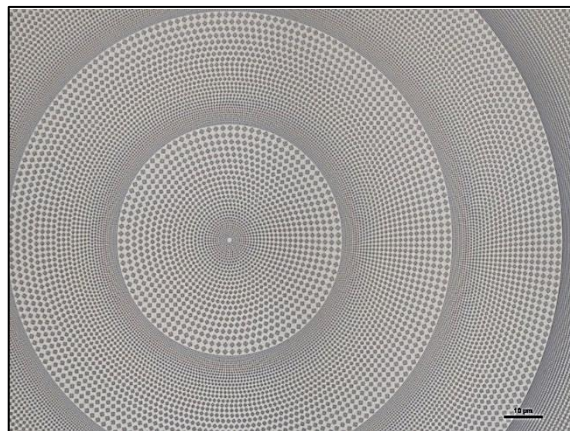
Die #4



Die #6



Metalens Structure – Hardmaster



Metalens Structure – S&R Master

Important: pattern fidelity and quality for best optical performance*

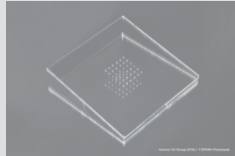
- ➔ Stable pattern height
- ➔ No missing structures detected

*TOPPAN Metalenses without functionality

EVG Nanoimprint Lithography | S&R Mastering to Wafer Level Imprint



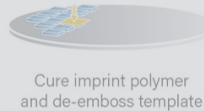
Single DIE Master



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EVG[®]770 S&R System



S&R Master



EVG[®]7300
SmartNIL[®] Module



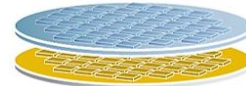
Working Stamp



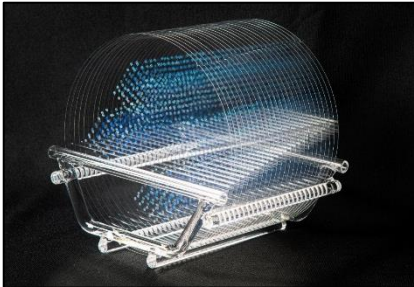
S&R Master



Multiple Imprints

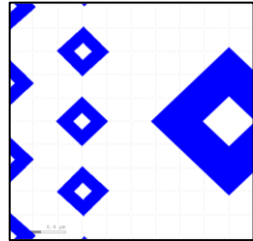


SmartNIL[®] Imprint

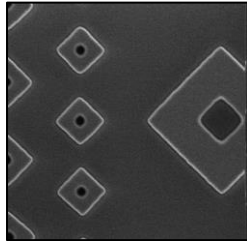


Working stamp manufacturing and imprinting performed in the same equipment

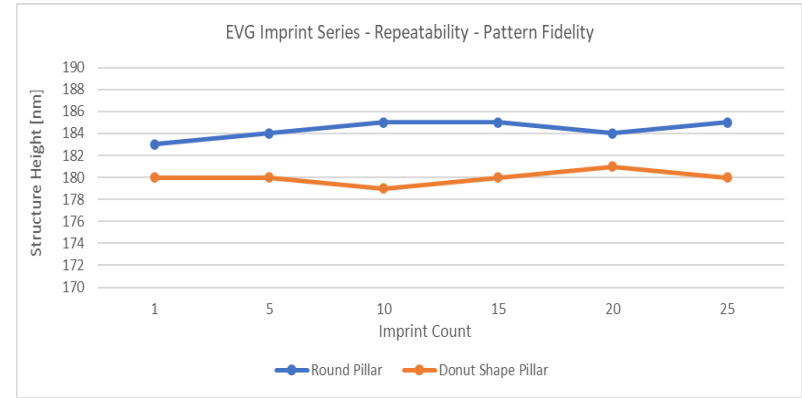
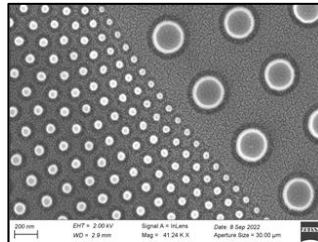
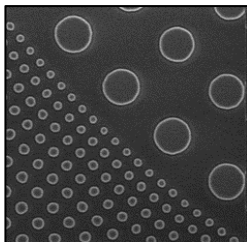
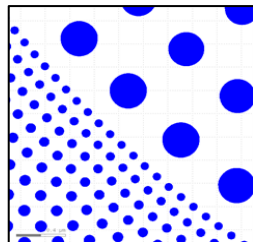
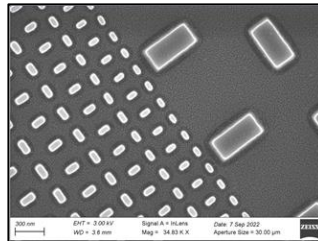
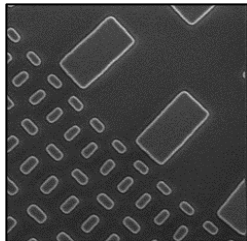
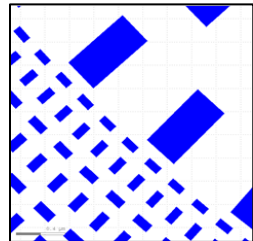
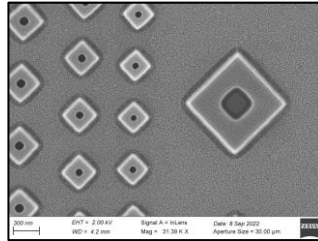
Design



TOPPAN
Quartz Master



EVG
SmartNIL® Imprint



SmartNIL® enables replication of different geometries / orientation / dimensions in a single shot

- ➔ High Wafer-to-Wafer pattern fidelity
- ➔ Large area imprinting

→ Nanoimprint equipment based manufacturing technologies enable next-generation freeform micro- and nanostructures

- Waver-level based manufacturing → large scaling factor
- Full know-how from single master die to the whole module → processing wafers up to 300 mm
- SmartNIL® Technology → highly flexible and insensitive to shapes and size
- Open materials platform
- NILPhotonics® Competence Center: Innovation Incubator → helping to ramp up



→ What can we do for you?

→ World Class Facility for...



- Customer demonstrations
- NIL Process development
- Joint R&D with partners
- Small volume pilot line production
- S&R mastering service
- NIL Process training

What we are searching for?

→ Collaboration Partners for...



- Materials
- Mastering
- Design
- New customer challenges 😊



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TOPPAN PHOTOMASK



EV GROUP® | Technologies

Manufacturing of Metalenses using Nanoimprint Lithography



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www.EVGroup.com
www.photomask.com



<https://bit.ly/makingmetalenses>

Thank You!

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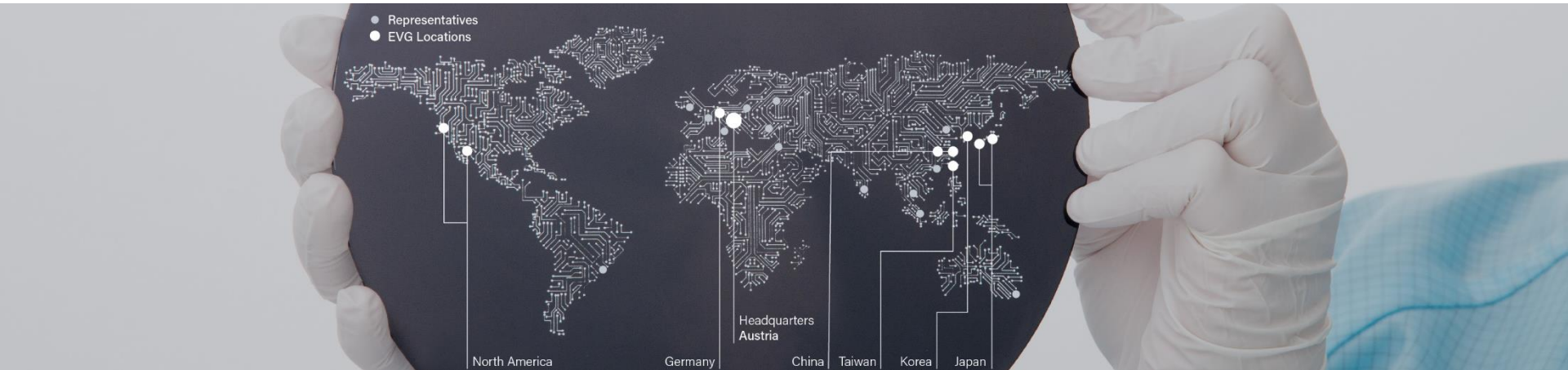
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