



# Touched by Perfection - How isishape<sup>®</sup> can make patterning easier

SID Exhibitor Forum, Vancouver, BC 2013

EMD Chemicals

Robert S Miller, Business Manager, LC and Emerging Technologies



# Merck is not the same as Merck

Merck KGaA, Darmstadt, Germany and the U.S. pharmaceutical company Merck & Co., New Jersey, USA, have been two independent companies since 1917.

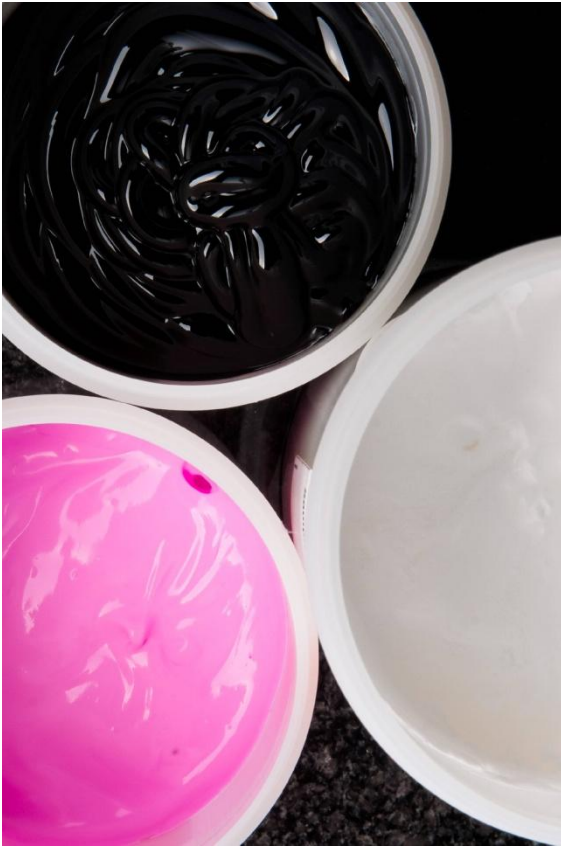
Common historical roots:

- 1891 Merck & Co. founded in New York by Georg Merck, a member of the Merck family
- As a consequence of World War I, Merck & Co. was expropriated and became an independent company.

Today, Merck & Co. holds the rights to the name within the US and Canada. Merck KGaA and its affiliated group companies operates here as EMD and holds the rights to the name Merck in the rest of the world.

In this presentation “Merck” stands for Merck KGaA, Darmstadt / Germany

# Smart Patterning Method



The screen printing of isishape® etching pastes is an efficient and high throughput process.

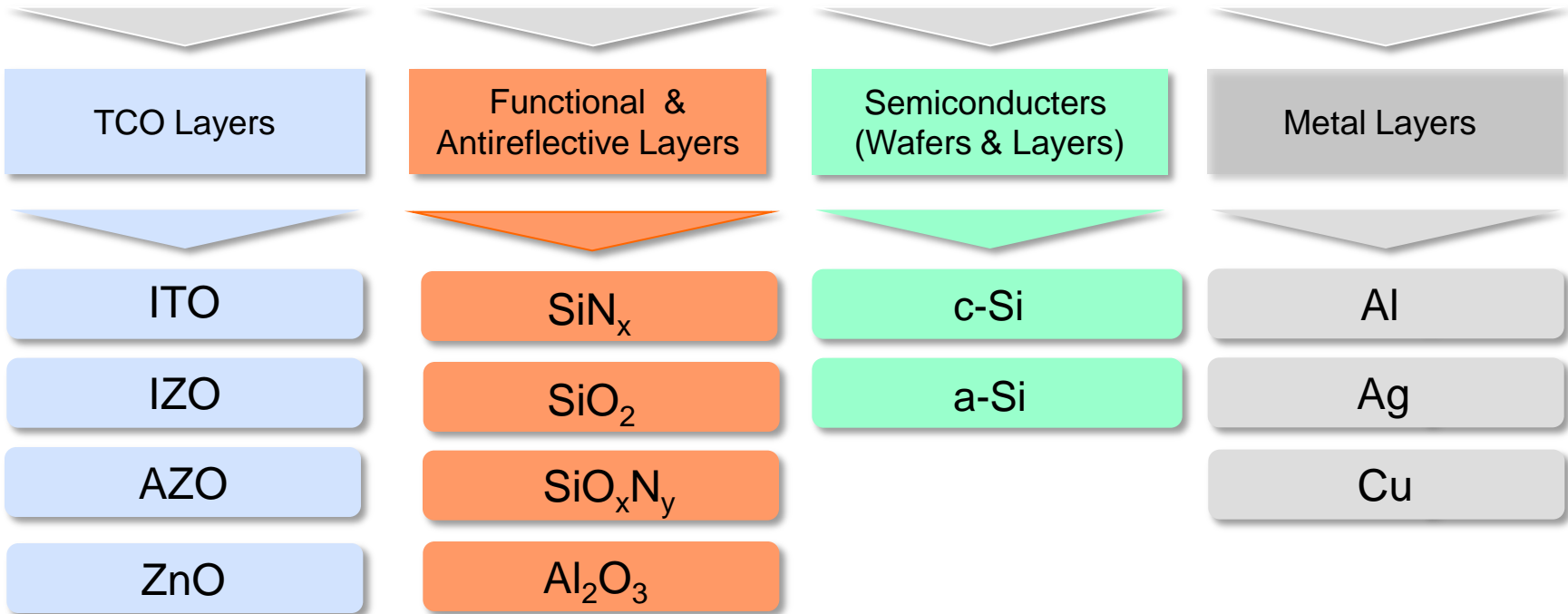
Lower operating and investment costs compared to other removal techniques such as laser ablation or photolithography.

No particle generation or substrate damage compared to laser ablation.

The use of isishape® in mass production at major touch panel manufacturers shows the acceptance of the concept.

# Materials Etched

## PRINTABLE STRUCTURING SOLUTIONS



*The chemical concept enables selective etching of layered systems.*

*Other structuring solutions possible.*

# The isishape<sup>®</sup> Structuring Process

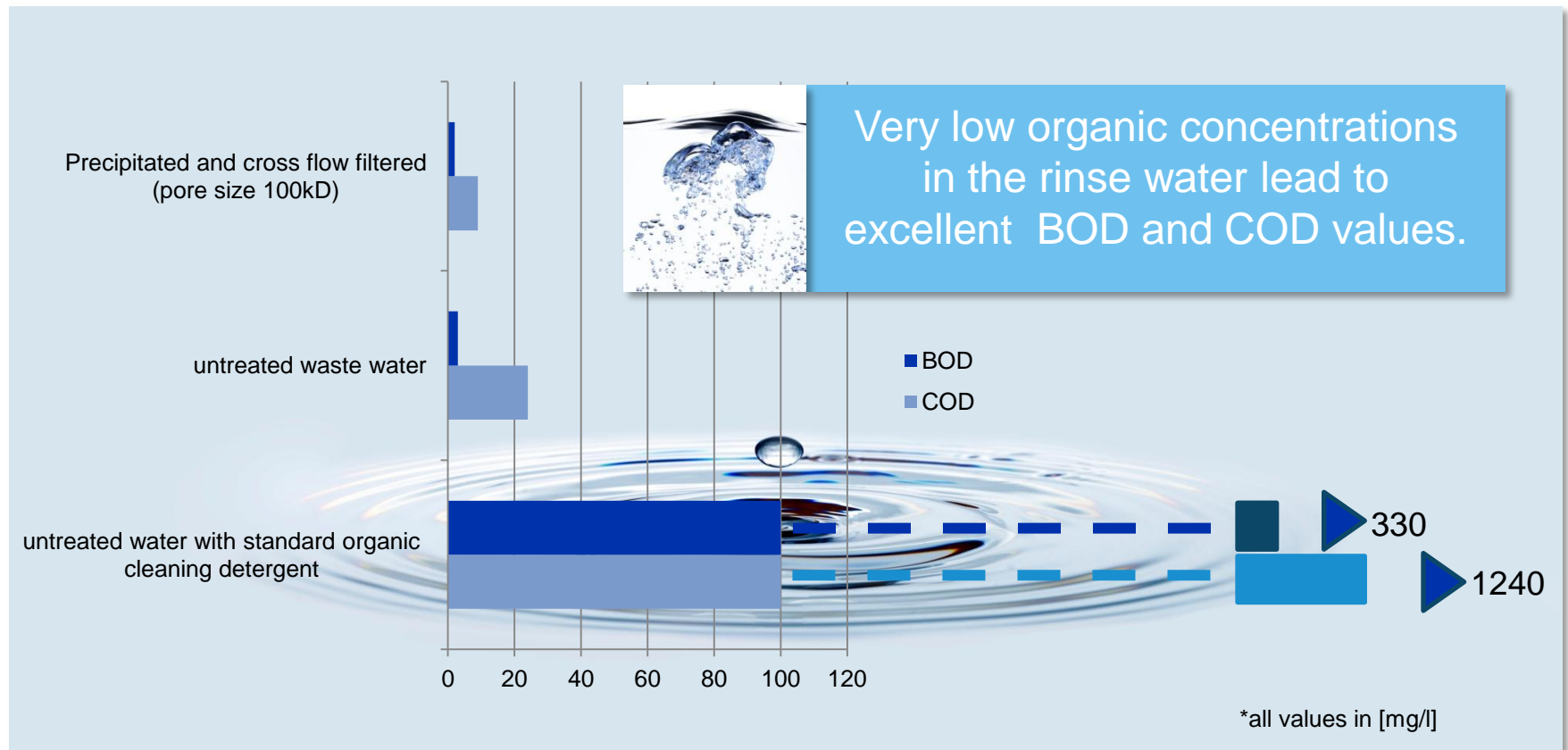
“EASY, FAST & ENVIRONMENTALLY FRIENDLY“

 isishape

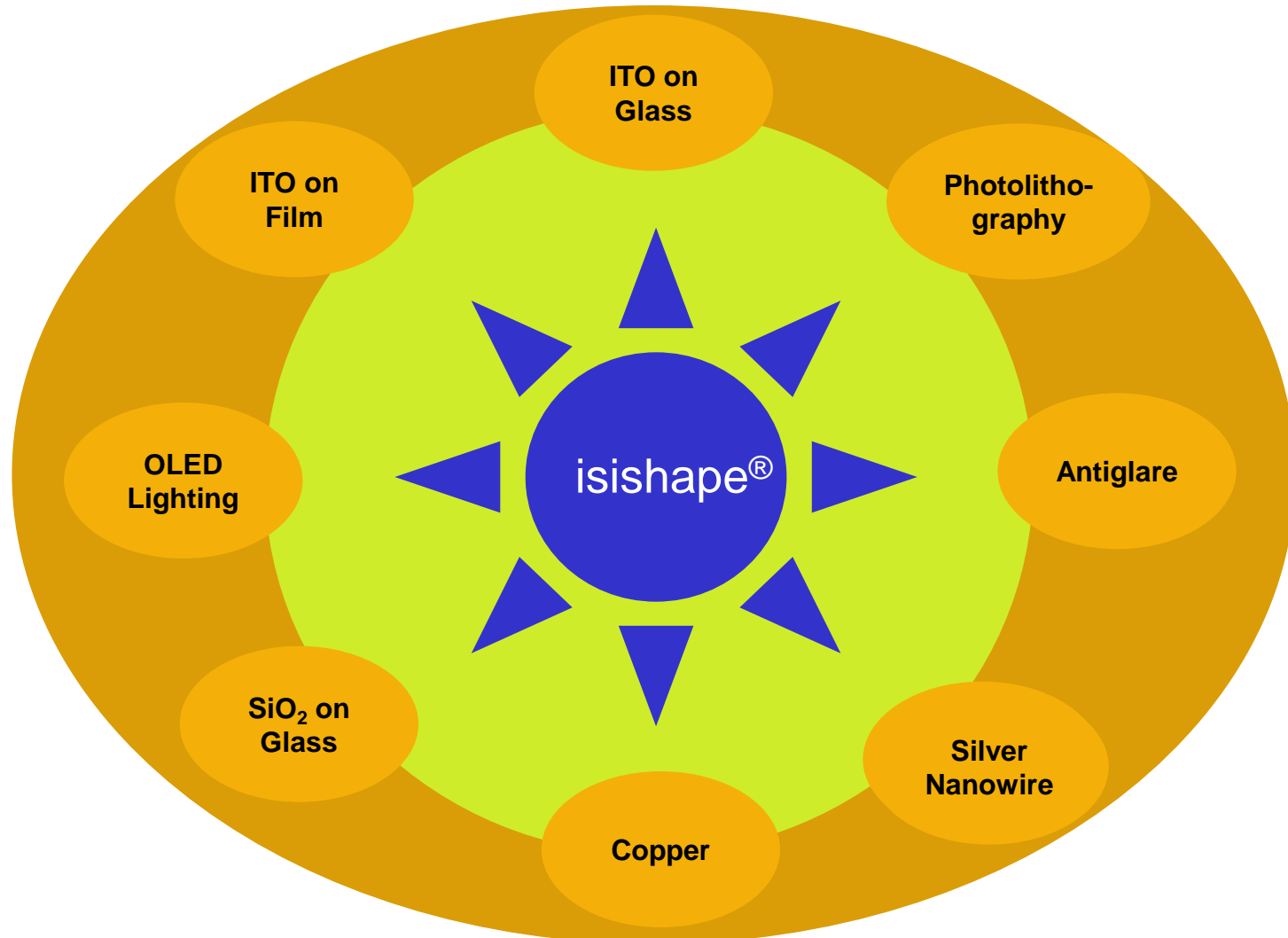


- Addresses touch panel industry and others e.g. OLED, optical coatings on glass
- Alternative to current subtractive patterning techniques, e.g. lithography, laser, masking
- Offers screen-printable etching materials
- Allows tact times of 1-2 seconds per substrate or wafer
- Handles typical substrate types: glass, plastic films from 15x15 up to 100x155 cm

# Advantages For The Environment

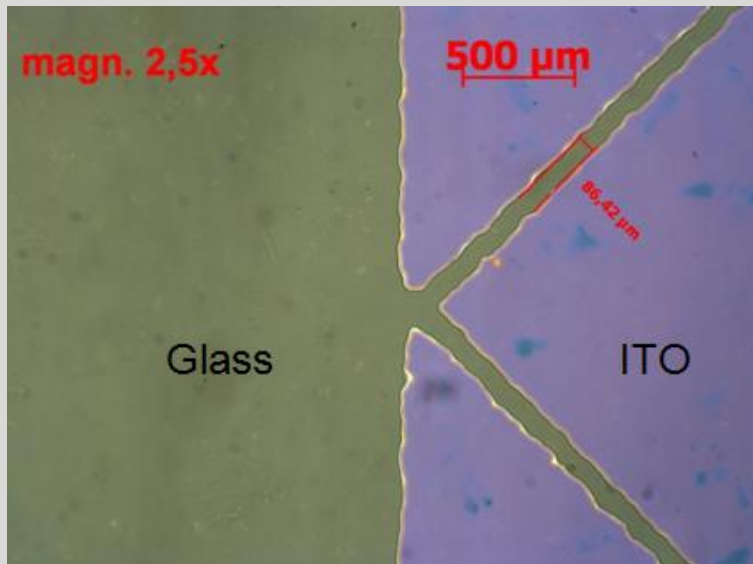


# The Touch Panel Platform And Products



# ITO on Glass - HiperEtch<sup>®</sup> 04S Type 10

## 130 nm ITO on Glass



Screen: Stainless Steel  
Pattern: 25 μm  
Etching: 170°C, 180 sec

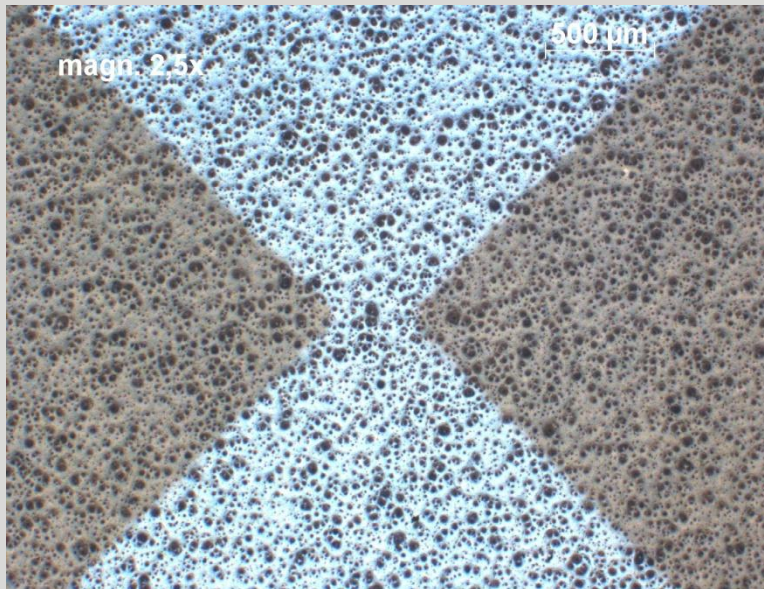
## Key features

- Screen-printable paste
- ITO etching at 100-180°C
- Smallest line width 50 μm on 130 nm crystalline ITO thickness
- Excellent cleaning of ITO glass and screens with water
- Very low concentrations of organic compounds and etchant in water after rinsing
- Environmentally-friendly process (no HF, no Cl<sub>2</sub>)



# ITO on Film - HiperEtch<sup>®</sup> 09S Type 40

## 50 nm ITO on Plastic Film



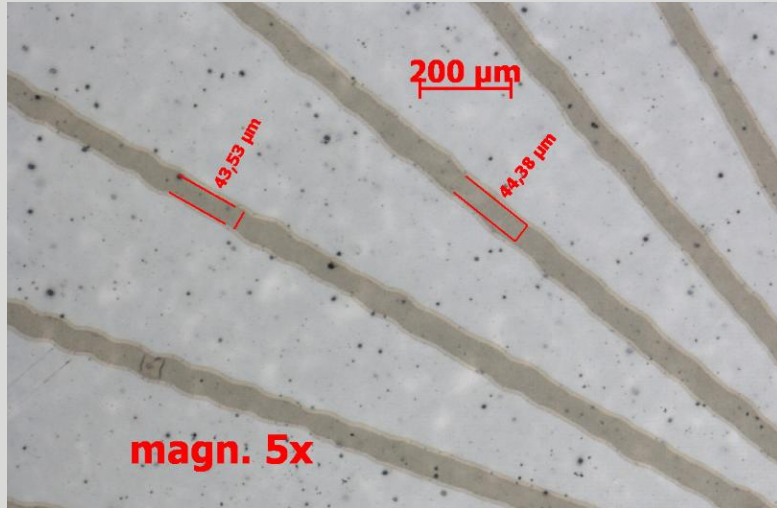
Screen: Stainless Steel  
Pattern: Diamond pattern  
Etching: 120°C, 180 sec

## Key features

- Screen-printable paste
- ITO etching at 100-150°C
- Qualified to structure line width <math><100 \mu\text{m}</math> on ITO glass and ITO plastic film
- Good cleaning of ITO plastic film with water and ultrasonic bath
- Environmentally-friendly process (no HF, no  $\text{Cl}_2$ )

# ITO on Film - HiperEtch<sup>®</sup> 19S Type 10

ITO on Film with 30 $\mu$ m screen pattern

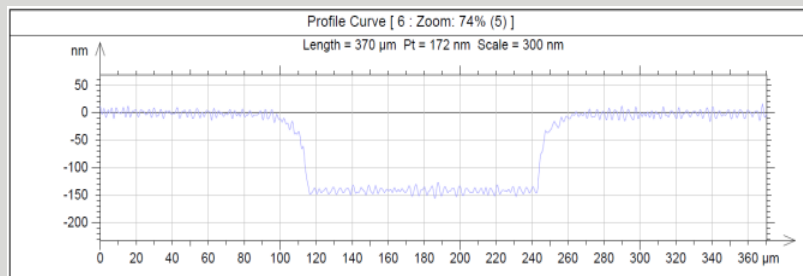
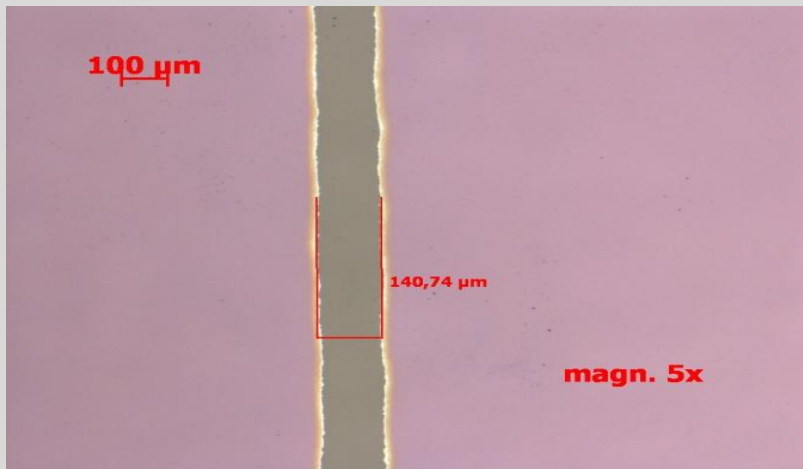


Key features

- Screen-printable paste
- ITO etching at 100-140°C
- Qualified to structure line width <100  $\mu$ m on ITO plastic film
- Perfect cleaning with water jet only!
- No color (not visible after printing)
- Environmentally-friendly process (no HF, no Cl<sub>2</sub>)

# OLED Lighting - HiperEtch<sup>®</sup> 04S Type 10

## ITO on Glass

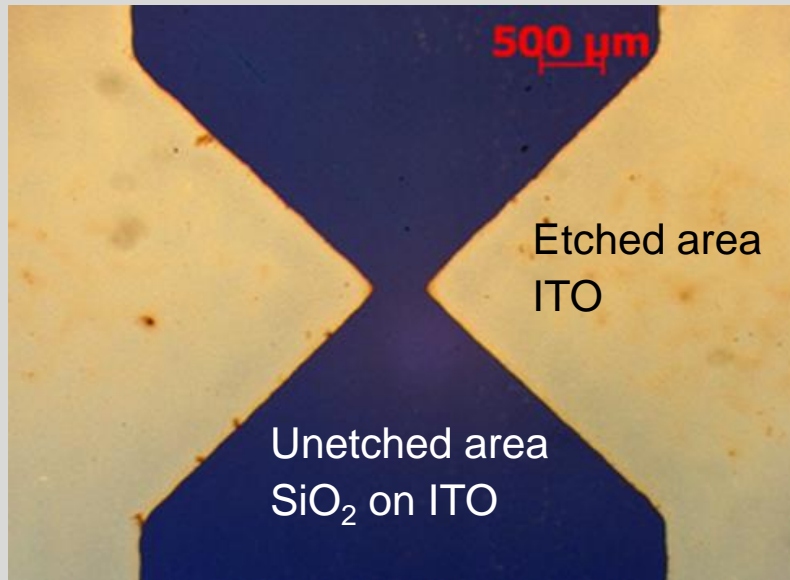


## Key features

- Opportunity for OLED application
- Cost advantage vs photolithography
- Perfect etching profile of etched ITO groove
- ITO etching at 170°C
- Perfect cleaning with water jet only!

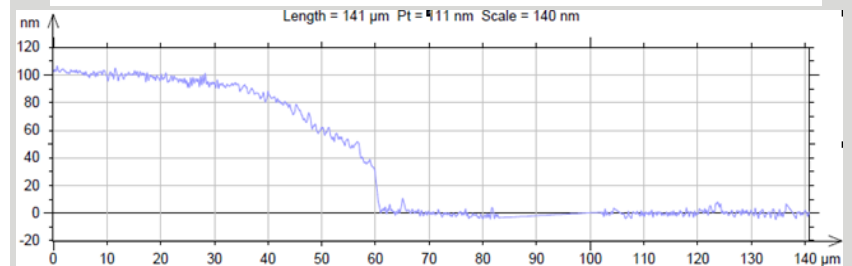
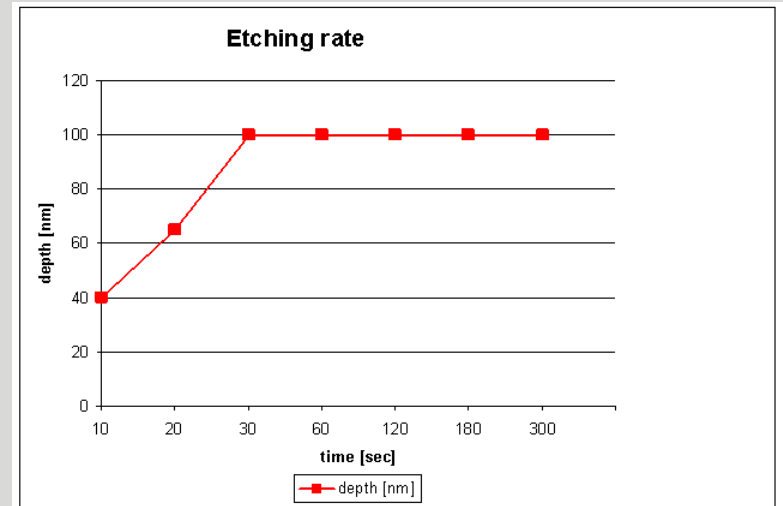
# SiO<sub>2</sub> on Glass - HiperEtch<sup>®</sup> 11S Series

SiO<sub>2</sub> (100nm) on ITO on glass



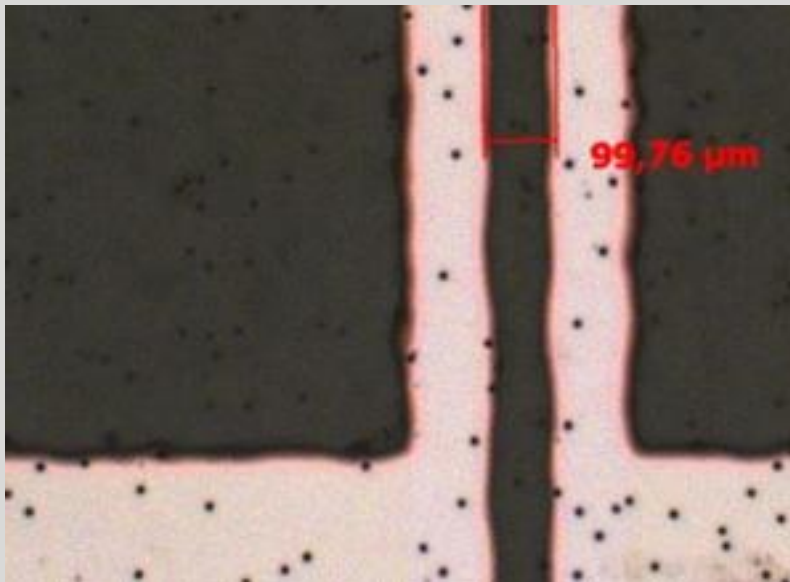
Screen: Stainless Steel  
 Pattern: Diamond  
 Etching: 3 min at room temperature

- Qualified structuring for Capacitive TP
- Selective etching of SiO<sub>2</sub> on ITO



# Copper - isishape<sup>®</sup> R&D sample 12-XW-06

Cu on ITO on Film

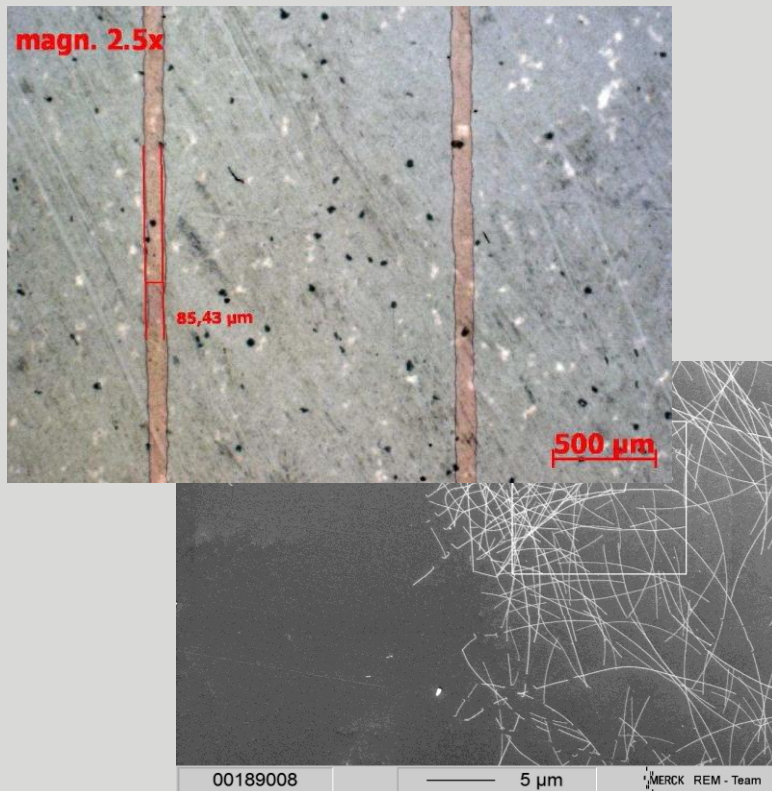


## Key features

- Opportunity for copper structuring
- Copper etching on film and glass at 130 -170°C and 5 min dwell time
- Etching of up to 300 nm copper layer thickness
- Very low concentrations of organic compounds and etchant in water after rinsing
- Environmentally-friendly process (no HF, no Cl<sub>2</sub>)

# Silver Nanowire - isishape<sup>®</sup> R&D sample 11-S-02

## Ag NW Film

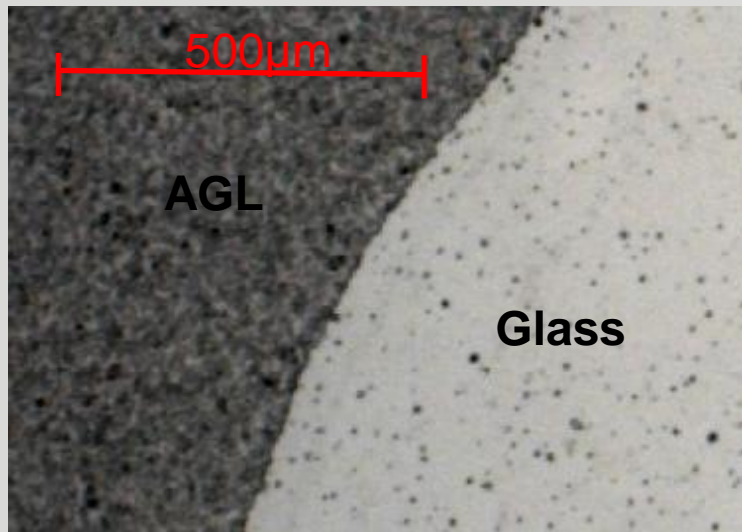


## Key features

- Screen-printable paste
- Structuring of Ag NW and CNT at 70-100°C
- Smallest line width 80 μm on PET film
- Excellent cleaning of substrates
- Very low concentrations of organic compounds and etchant in water after rinsing
- Environmentally-friendly process (no HF, no Cl<sub>2</sub>)

# Antiglare - isishape<sup>®</sup> R&D sample 11-S-02

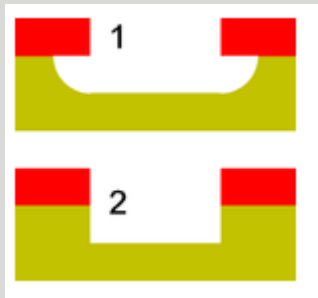
## Antiglare Layer on Glass



## Key features

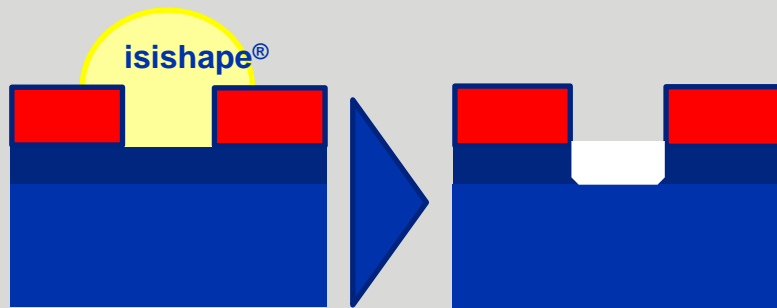
- Opportunity for Antiglare Layer (AGL) polymer structuring
- AGL etching at 180°C and 5 min dwell time
- Excellent wetting of substrate without pin holes
- Very low concentrations of organic compounds and etchant in water after rinsing
- Environmentally-friendly process (no HF, no Cl<sub>2</sub>)

# Photolithography - isishape<sup>®</sup> R&D sample 12-XW-06



1 Isotropic etching

2 Anisotropic etching with 12-XW-06



## Key features

- Opportunity for OGS application
- No isotropic etching with etching paste and photolithography (Improved yield due to less underetching of etch resist!)
- Qualified to structure line width <math><30 \mu\text{m}</math> on ITO glass
- ITO etching at 100-140°C
- Perfect cleaning with water jet only!



# Do you want to structure smart & simple?



Advanced Materials for New Production & Application Concepts

Easy, Fast & Environmentally-Friendly

**WE WILL SUPPORT YOUR SUCCESS**

[robert.miller@emdmillipore.com](mailto:robert.miller@emdmillipore.com)

[barry.seff@emdmillipore.com](mailto:barry.seff@emdmillipore.com)

