Touched by Perfection - How isishape® 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
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.
The chemical concept enables selective etching of layered systems.

Other structuring solutions possible.
The isishape® Structuring Process

“EASY, FAST & ENVIRONMENTALLY FRIENDLY”

- 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

Precipitated and cross flow filtered (pore size 100kD)

untreated waste water

untreated water with standard organic cleaning detergent

Very low organic concentrations in the rinse water lead to excellent BOD and COD values.

BOD
COD

*all values in [mg/l]
The Touch Panel Platform And Products

- ITO on Glass
- ITO on Film
- Photolithography
- OLED Lighting
- Antiglare
- SiO₂ on Glass
- Silver Nanowire
- Copper
ITO on Glass - HiperEtch® 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 Cl₂)
ITO on Film - HiperEtch® 09S Type 40

Key features

- Screen-printable paste
- ITO etching at 100-150°C
- Qualified to structure line width <100 µm on ITO glass and ITO plastic film
- Good cleaning of ITO plastic film with water and ultrasonic bath
- Environmentally-friendly process (no HF, no Cl₂)

50 nm ITO on Plastic Film

Screen: Stainless Steel
Pattern: Diamond pattern
Etching: 120°C, 180 sec
ITO on Film - HiperEtch® 19S Type 10

Key features

- Screen-printable paste
- ITO etching at 100-140°C
- Qualified to structure line width <100 μm on ITO plastic film
- Perfect cleaning with water jet only!
- No color (not visible after printing)
- Environmentally-friendly process (no HF, no Cl₂)

ITO on Film with 30μm screen pattern

magn. 5x
OLED Lighting - HiperEtch® 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$_2$ on Glass - HiperEtch® 11S Series

- Qualified structuring for Capacitive TP
- Selective etching of SiO$_2$ on ITO

**SiO$_2$ (100nm) on ITO on glass**

Screen: Stainless Steel  
Pattern: Diamond  
Etching: 3 min at room temperature
Copper - isishape® 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 Cl₂)
Silver Nanowire - isishape® R&D sample 11-S-02

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 Cl₂)
Antiglare - isishape® R&D sample 11-S-02

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 Cl₂)
Photolithography - isishape® R&D sample 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 <30 µm on ITO glass
- ITO etching at 100-140°C
- Perfect cleaning with water jet only!
Do you want to structure smart & simple?

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WE WILL SUPPORT YOUR SUCCESS

robert.miller@emdmillipore.com
barry.seff@emdmillipore.com