CAPITAL MARKETS DAY

LPKF LASER & ELECTRONICS AG | 17 SEPTEMBER 2020

AGENDA
17.09.2020

15:00 CET | KEY NOTE – Big Picture
Goetz M. Bendele (CEO) & Christian Witt (CFO)
Presentation (30 minutes)

15:30 CET | Q&A Panel
(15 minutes)

15:45 CET | WELDING
Simon Reiser (Managing Director Welding)
Presentation and Q&A (20 minutes)

16:05 CET | SOLAR
Juergen Bergedieck (Managing Director Solar)
Presentation and Q&A (20 minutes)

16:25 CET | ELECTRONICS
Roman Ostholt (Managing Director Electronics)
Presentation and Q&A (20 minutes)

16:45 CET | LIDE
Roman Ostholt (Managing Director Electronics)
Presentation and Q&A (40 minutes)

17:25 CET | ARRALYZE
Robin Krueger (Head of Product Management and Innovation)
Presentation and Q&A (15 minutes)

17:40 CET | WRAP-UP and final Q&A Panel
Goetz M. Bendele (CEO) & Christian Witt (CFO)
Wrap-up and Q&A (20 minutes)

END

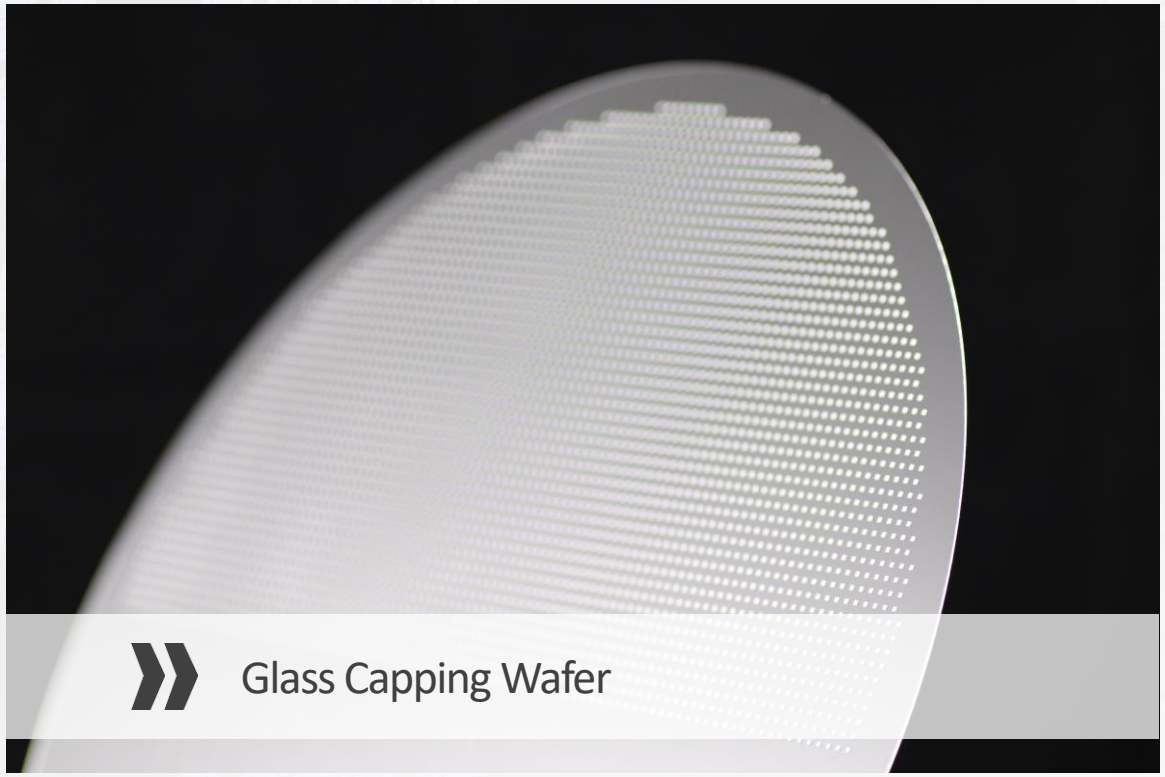
LPKF CAPITAL MARKETS DAY

LIDE

Presented by Dr. Roman Ostholt

GLASS

GLASS IS A HIGHLY INTERESTING MATERIAL BECAUSE OF ITS PROPERTIES



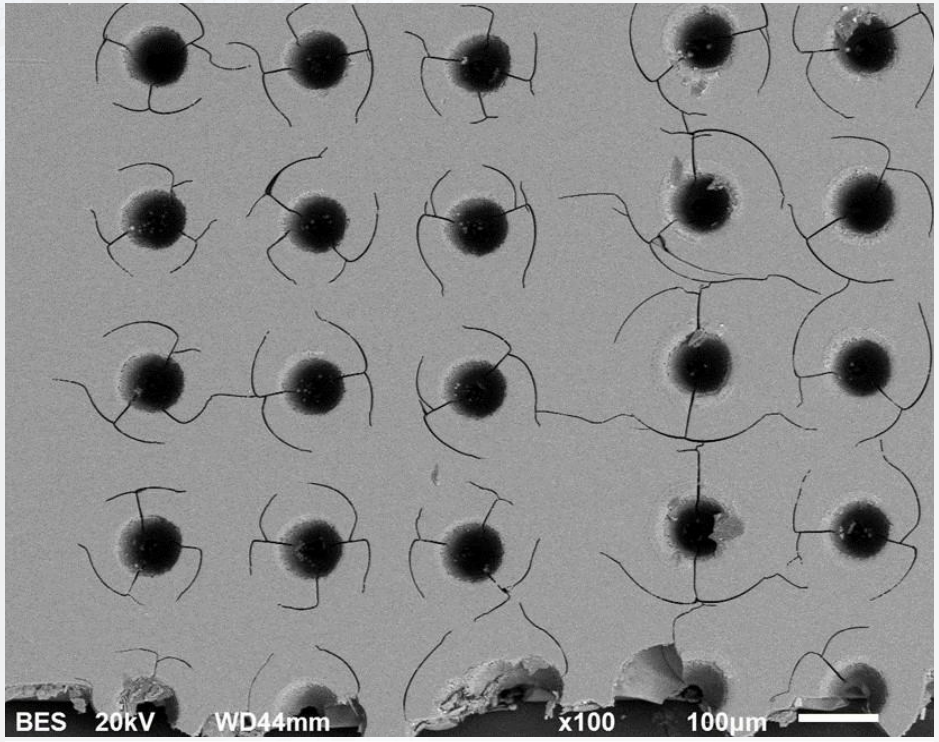
Glass Capping Wafer

UNIQUE SET OF PROPERTIES

- Thermally resistant
- Good mechanical properties
- Excellent electrical insulator
- Chemically inert
- Transparent
- High surface quality and flatness
- Tunable coefficient of thermal expansion
- Homogeneous isotropic material
- Outstanding haptic impression
- Low cost

GLASS PROCESSING IS A GREAT CHALLENGE

THE PROCESSABILITY CURRENTLY LIMITS ITS APPLICATION POSSIBILITIES



Standard laser drilled holes with surface defects (revealed by an etch dip)

COMMON PROCESSES FOR GLASS PROCESSING

Masked Isotropic Etching

Milling

Water Jet Cutting

Direct Laser Ablation

Scribe and Break

COMMON DRAWBACKS

(Subsurface) Microcracks

Induced stress

Low aspect-ratio

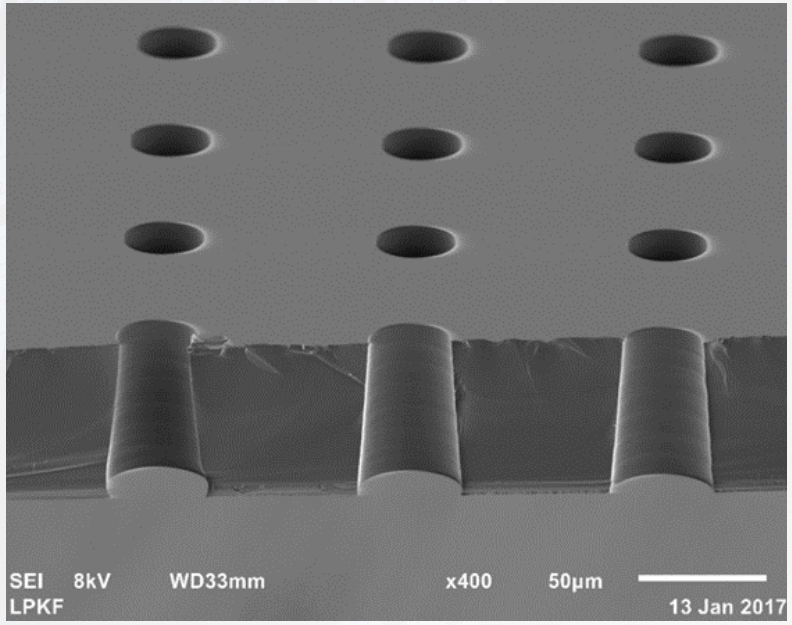
Debris

Inaccuracy

Cost

LASER INDUCED DEEP ETCHING

UNIQUE AND PATENTED LPKF PROCESS



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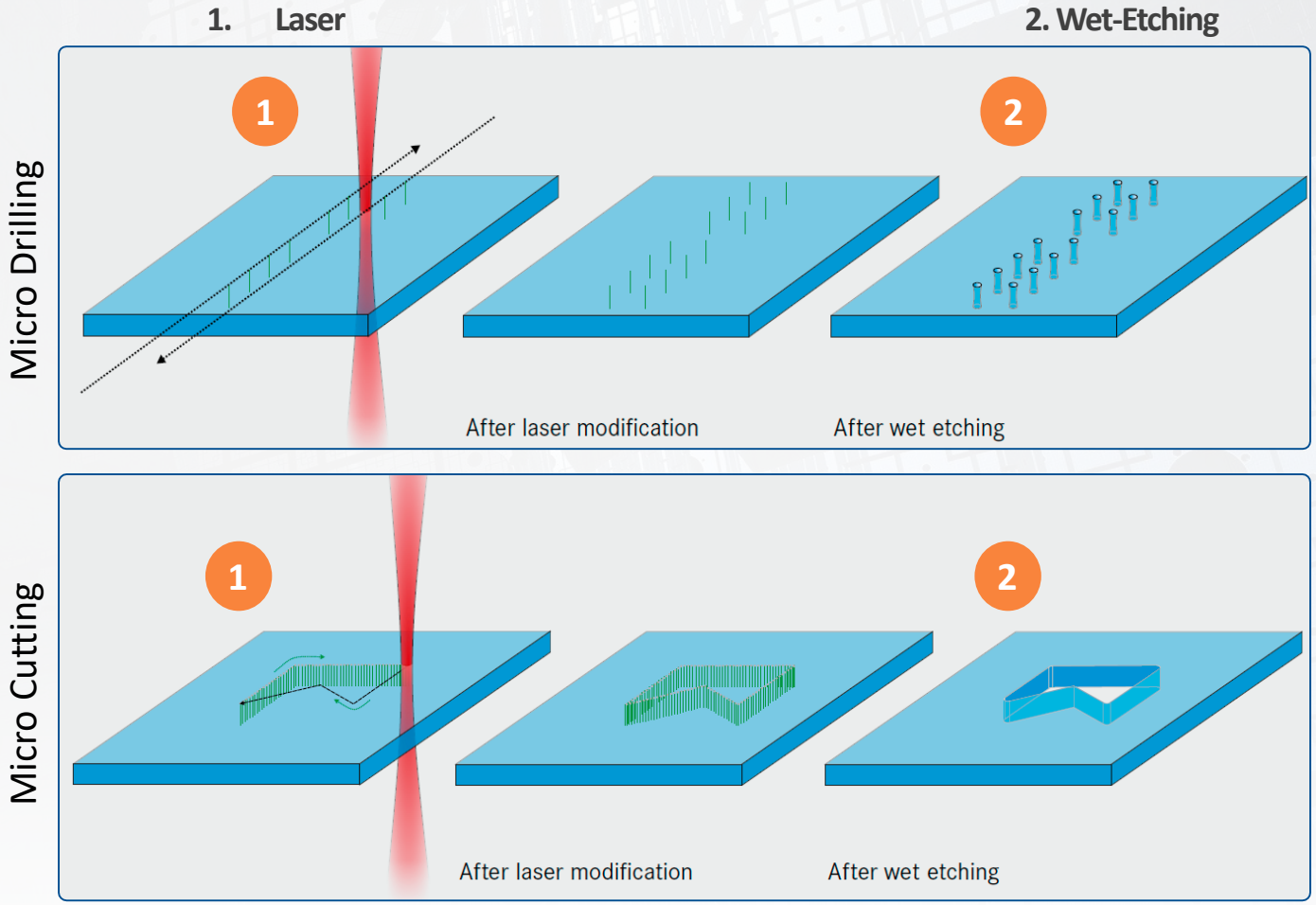
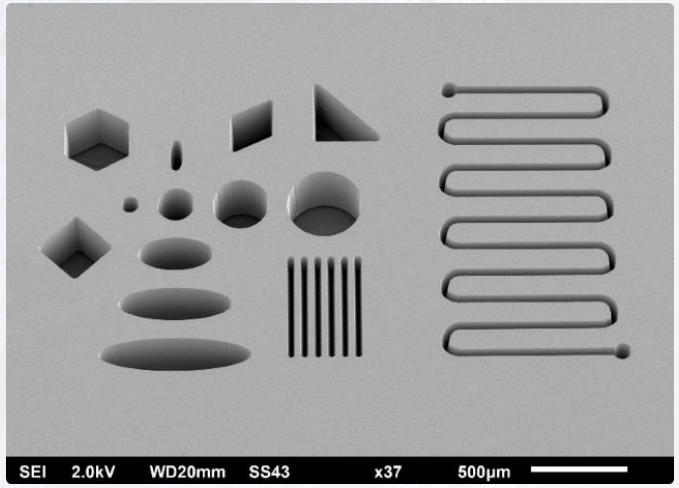
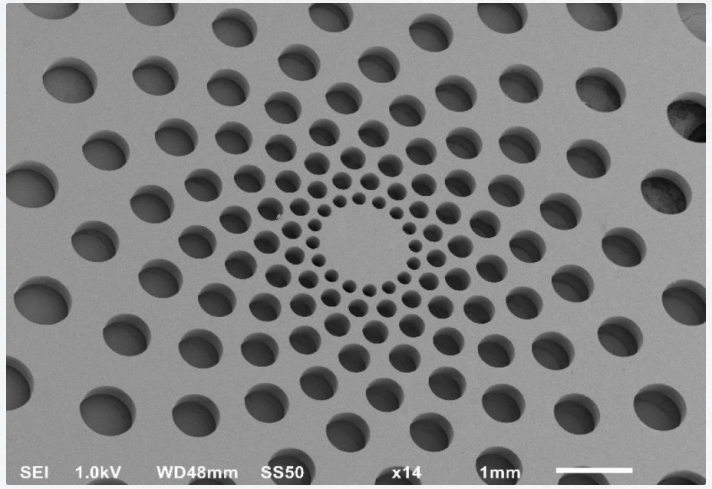
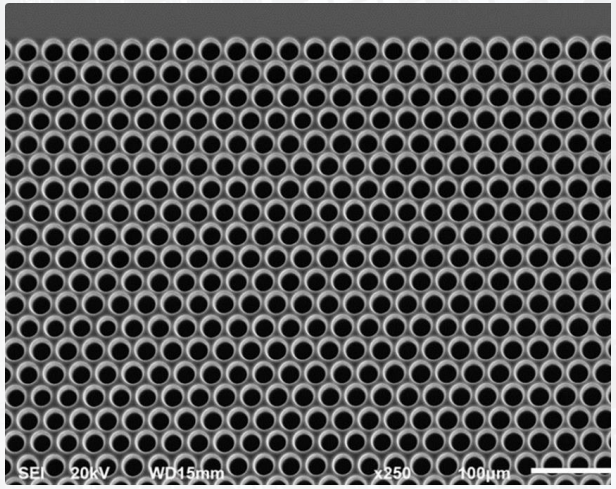


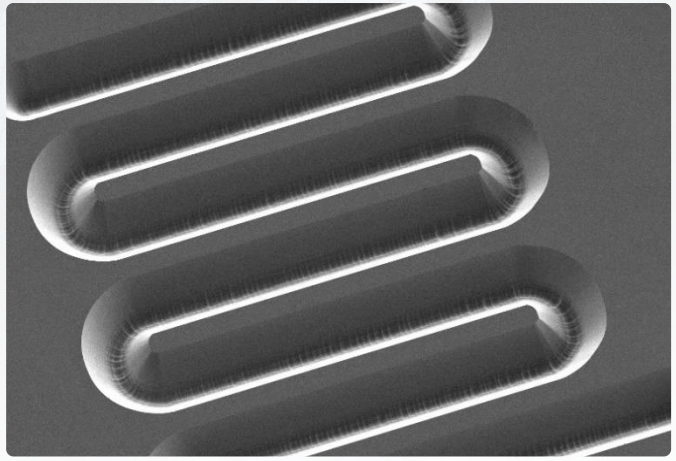
DEEP FEATURES IN THIN GLASS

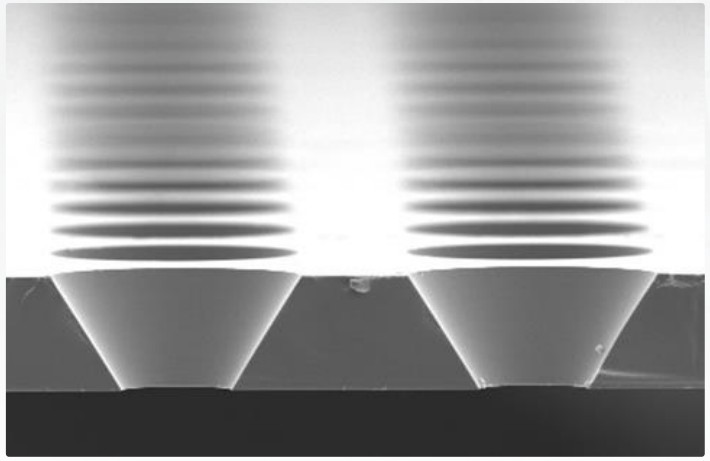
LIDE IS A BASE TECHNOLOGY FOR A GREAT VARIETY OF APPLICATIONS

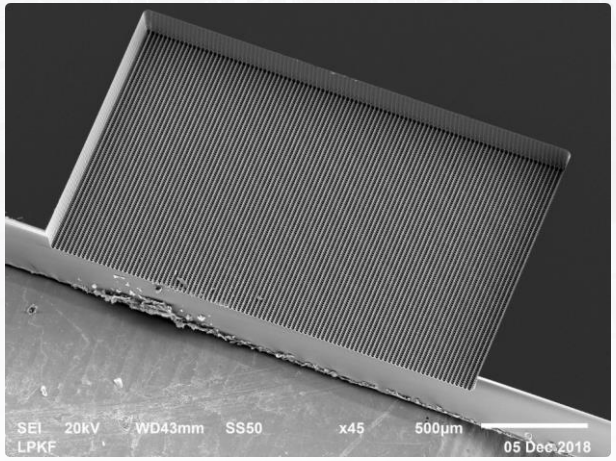






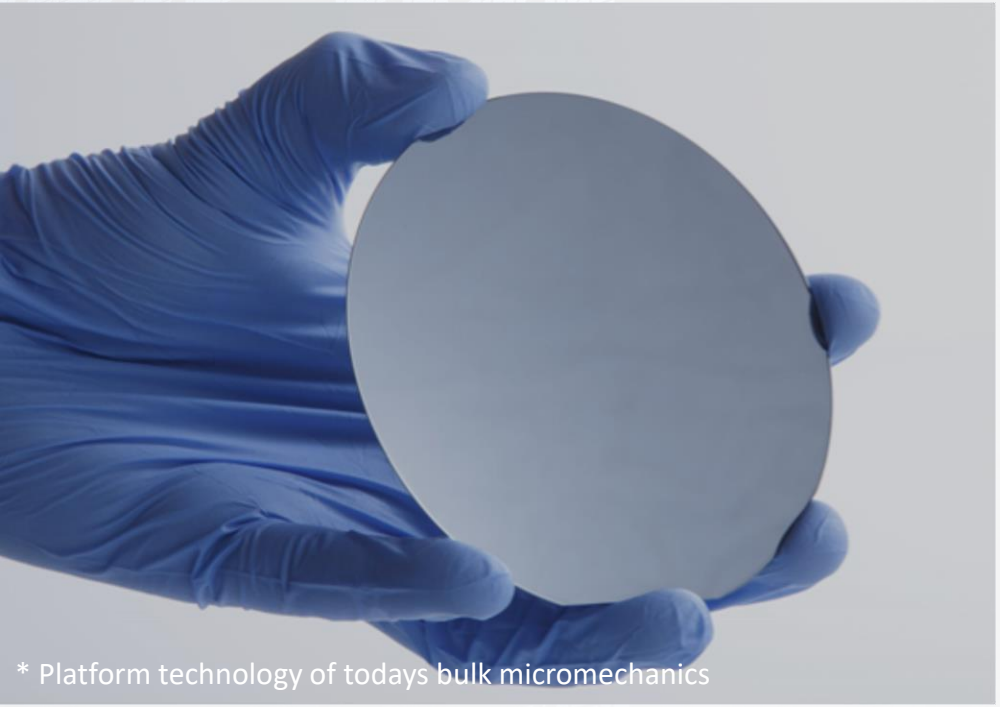






IN OTHER WORDS

LIDE IS BECOMING THE NEW PLATFORM TECHNOLOGY FOR MICROSYSTEMS

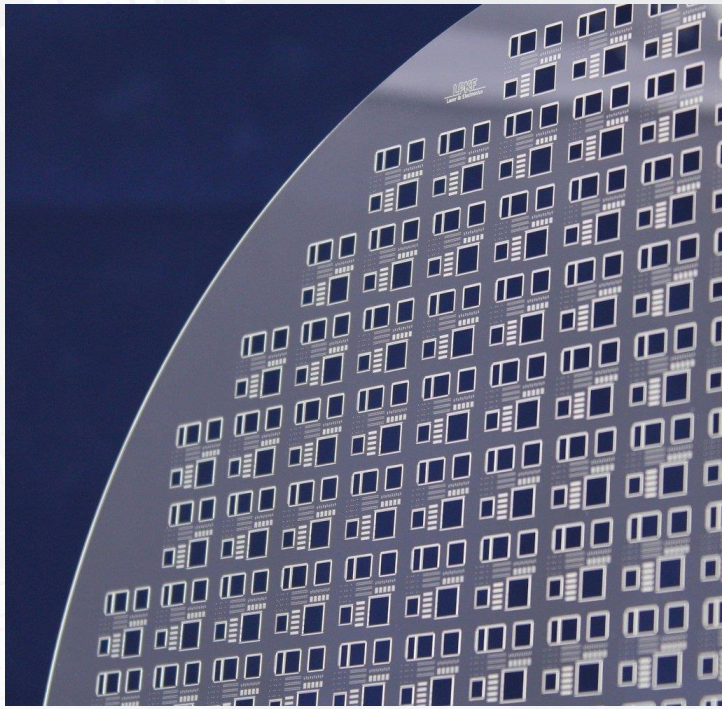


* Platform technology of todays bulk micromechanics

LIDE IS TO GLASS

WHAT

DEEP REACTIVE ION ETCHING (DRIE) IS TO SILICON*



- CORE APPLICLATIONS:IC PACKAGING, DISPLAY, LIFE SCIENCE, MEMS, OPTICS

WHAT MAKES US SO CONFIDENT?

THREE MAIN ADVANTAGES ULTIMATELY TRANSLATE INTO COST BENEFITS

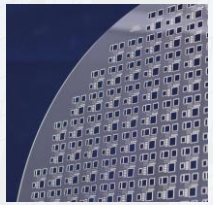
GLASS HAS AN ATTRACTIVE SET OF PROPERTIES. APPLIED IN THE RIGHT WAY, IT IS A CLEAR DIFFERENTIATOR

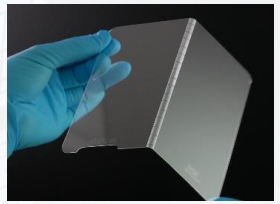
MATERIAL AND PROCESSING COSTS CAN BE REDUCED MASSIVELY

SIGNIFICANTLY SHORTER PRODUCT DEVELOPMENT CYCLES DUE TO DIGITAL PROCESS CHAIN

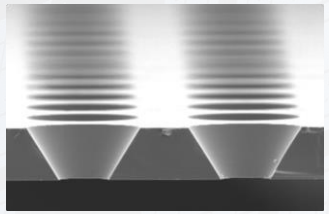
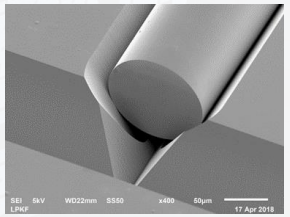
LIDE COMMERCIALIZATION STRATEGY

WE ADAPT FLEXIBLY TO DIFFERENT CUSTOMER SEGMENTS AND APPLICATIONS

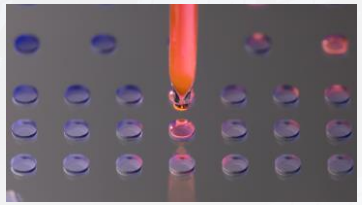


OEM Business

Manufacturing Service



LIDE Based Solutions

Applications

- Semiconductor
- Display

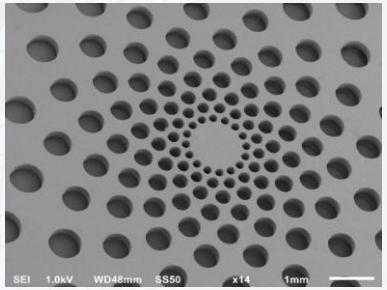
- Inkjet
- Wafer Level Optics

- Arralyze

OEM BUSINESS

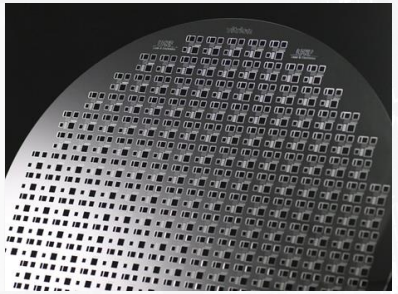
FOCUS ON SEMICONDUCTOR AND DISPLAY CUSTOMERS

Vitrion M5000



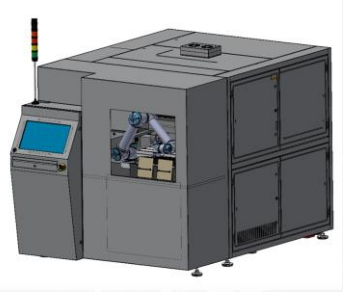
- Manual tool for all applications
- Qualification and process development
- Can accommodate various substrates and tasks

Vitrion S5000



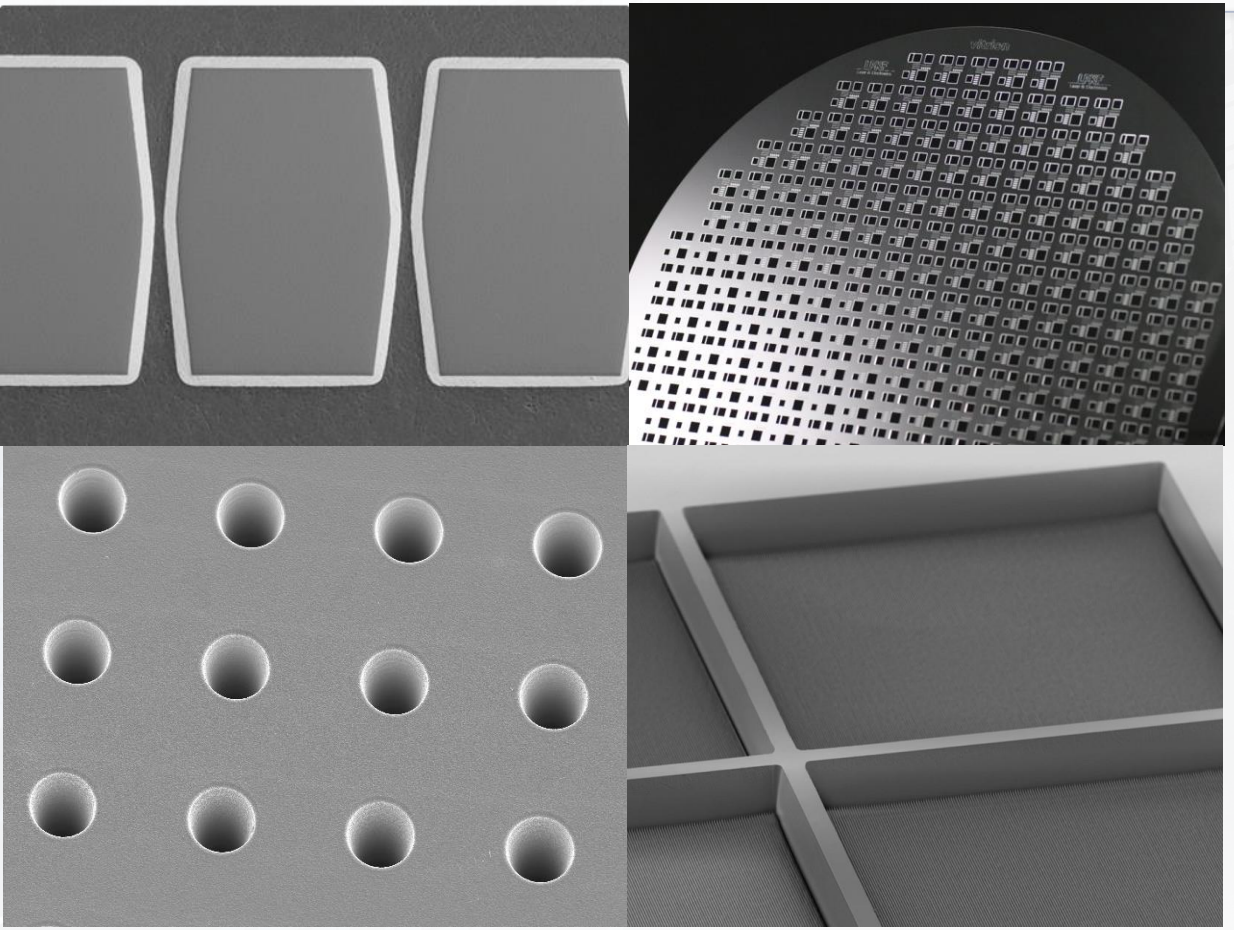
- Mass production derivate of M5000
- For semiconductor industry
- Fully automated tool with Fab connector
- Wafer processing

Vitrion CG5000



- Mass production derivate of M5000
- For cover glasses processes
- Fully automated tool
- Availability Q4/20

SEMICONDUCTOR
IC PACKAGING



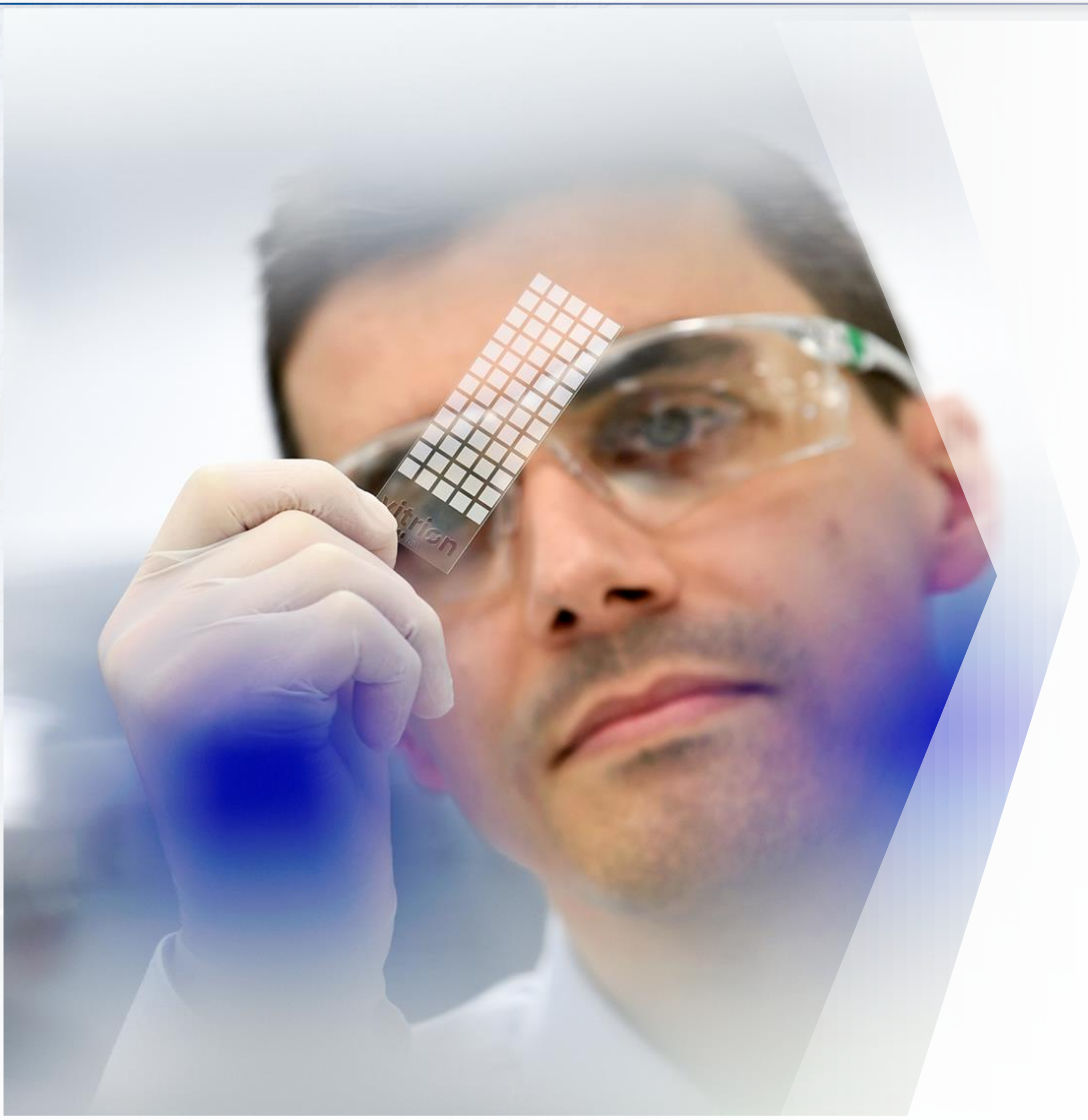
FEATURES

- Through Glass Vias
- Dicing Streets
- Open Cavities
- Closed Cavities

High aspect ratio features used in semiconductor applications

SEMICONDUCTOR CUSTOMERS

INVESTMENTS PAY OFF QUICKLY



1. EXAMPLE

- Switch from cost intensive single crystal material (Silicon, LiTaO3, …)
- Cost saving per wafer

→**Payback period of 0.9 year**

2. EXAMPLE

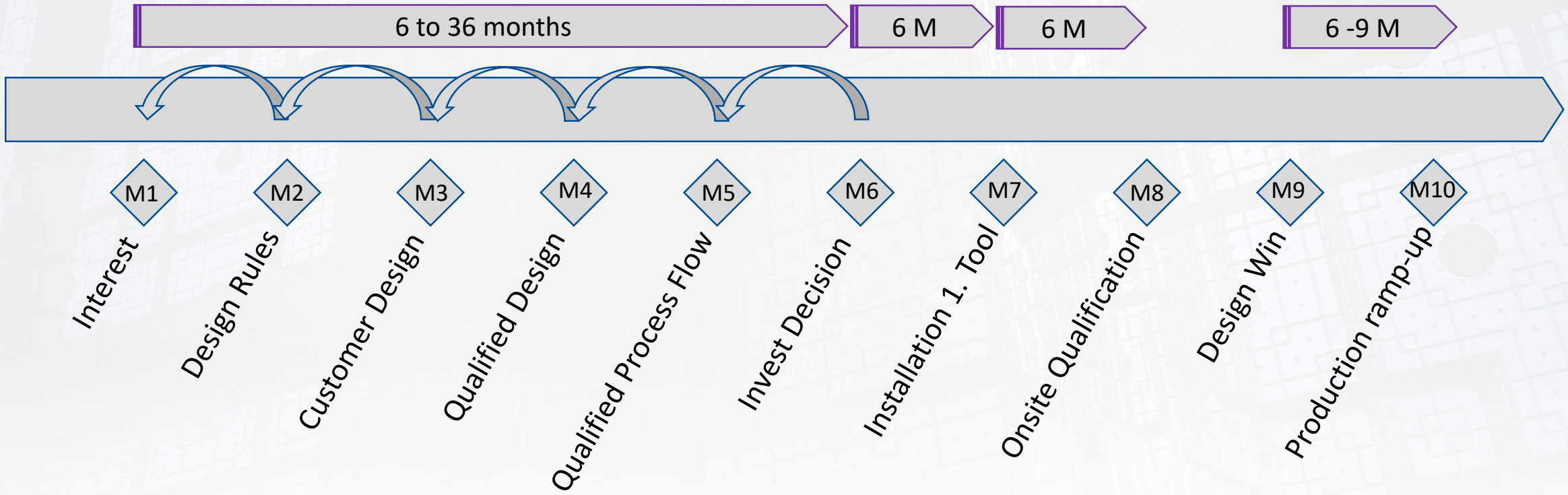
- New features (Through Glass Vias, LIDE dicing, …)
- Replace and sell used tools by high productive Vitrion tool:
  - Lower net CAPEX and
  - lower operational cost

→**Payback from day 1**

SEMICONDUCTOR CUSTOMER JOURNEY

LIDE as new base technology is being tested intensively before mass production

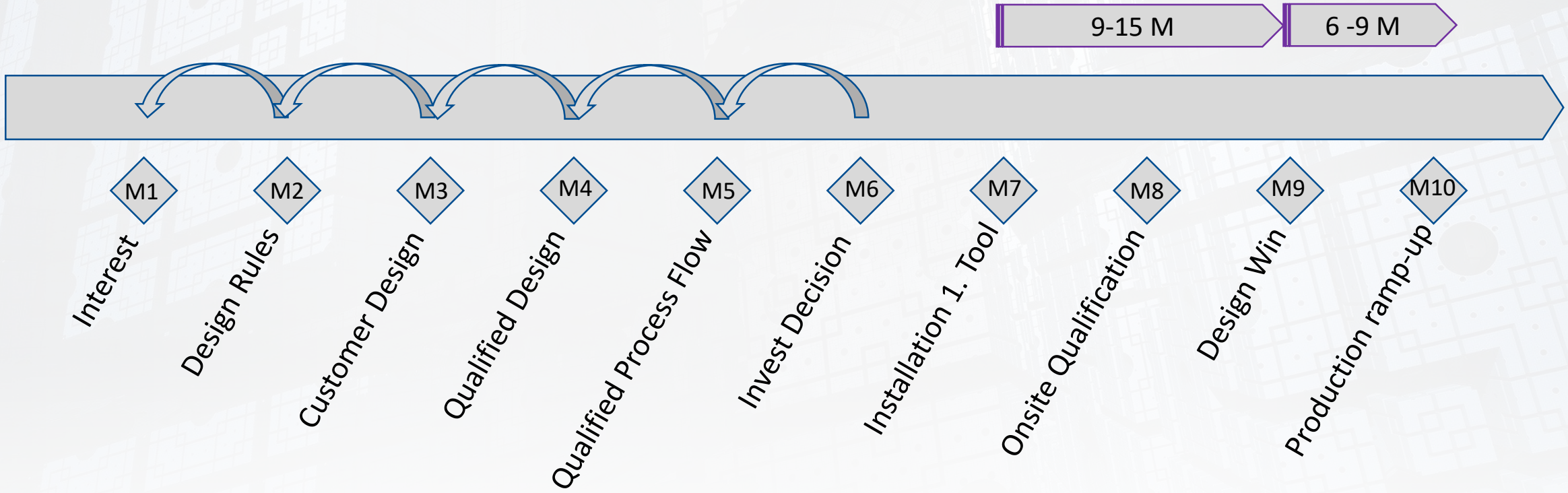
First LIDE Project



SEMICONDUCTOR CUSTOMER JOURNEY

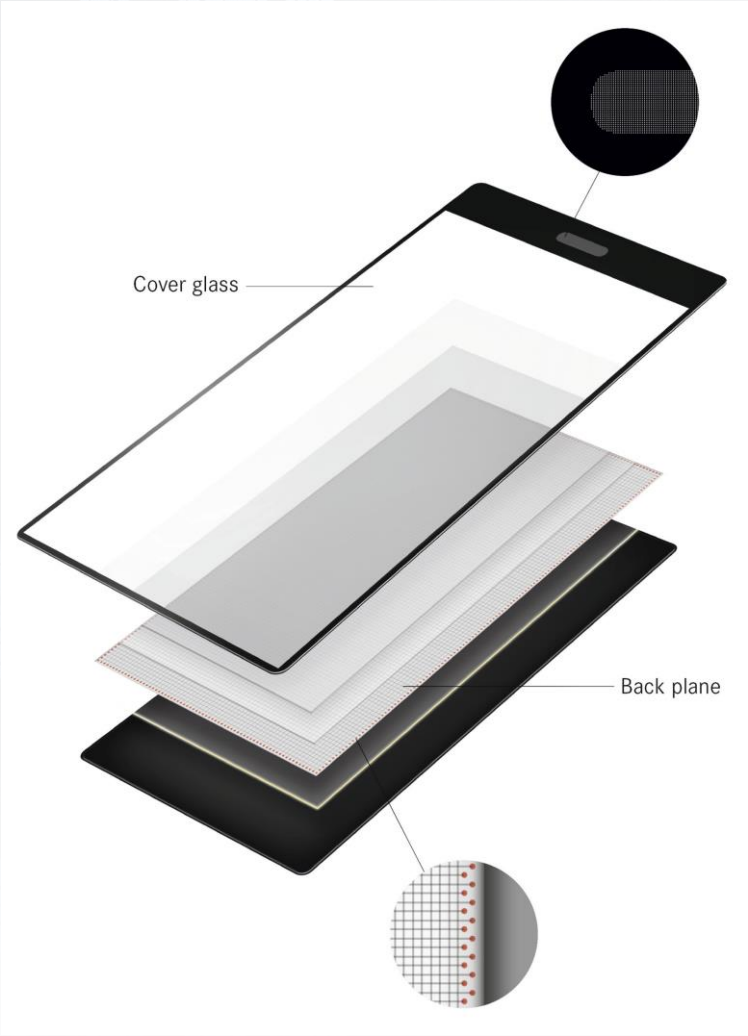
LIDE as new base technology is being tested intensively before mass production

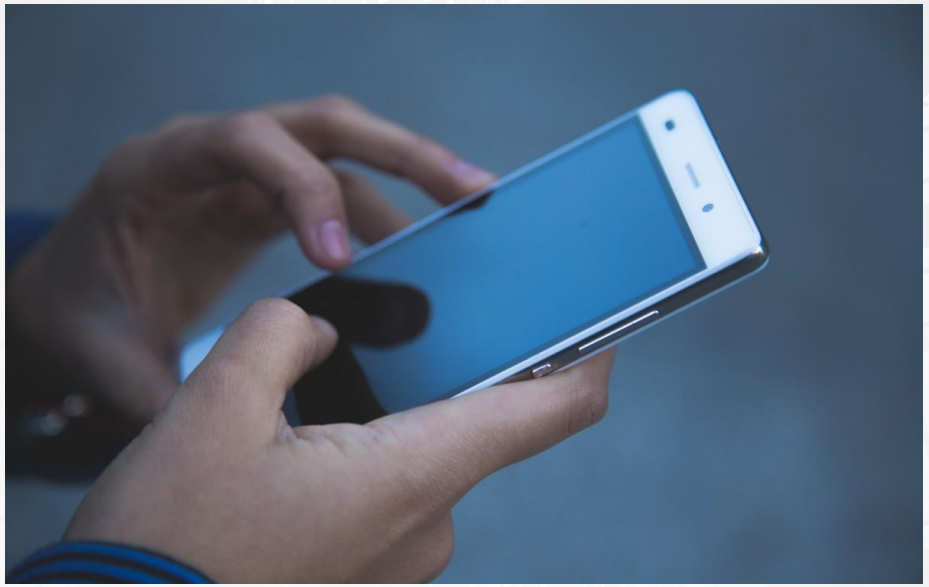
Subsequent LIDE Projects



DISPLAY

Several layers of glass can be found in displays



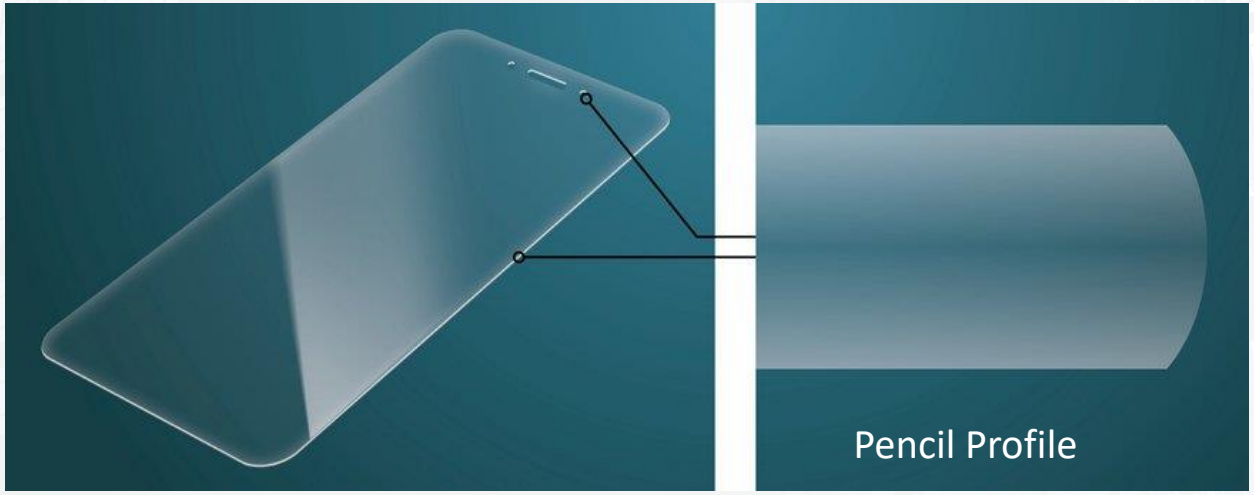


COVER LENS

SINCE IPHONE1: GLASS IS THE PREMIUM MATERIAL FOR COVER LENSES

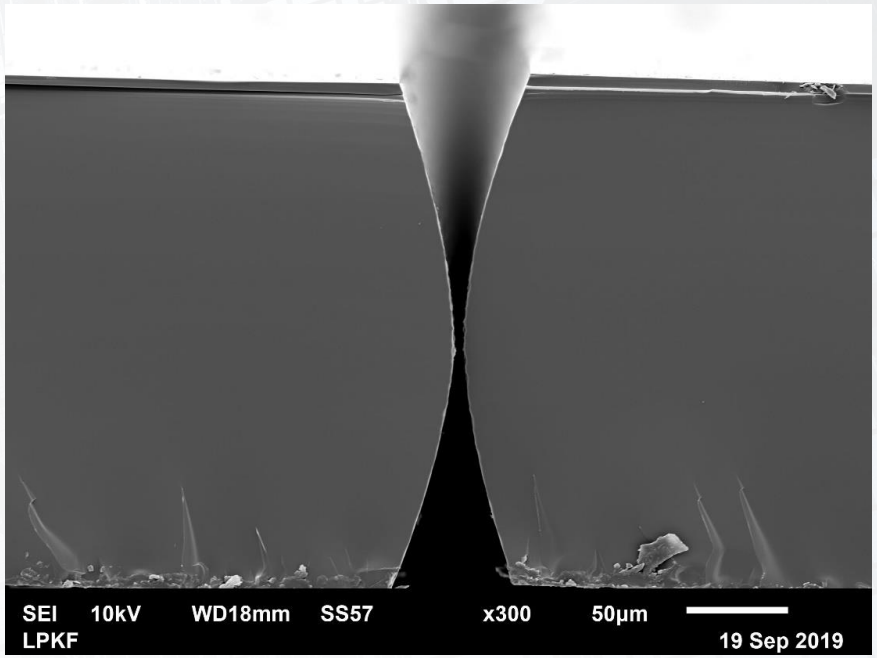
COVER GLASS

THE FRACTURE RESISTANCE DEPENDS ON THE EDGE QUALITY



DIRECT PENCIL CUT (DPC)

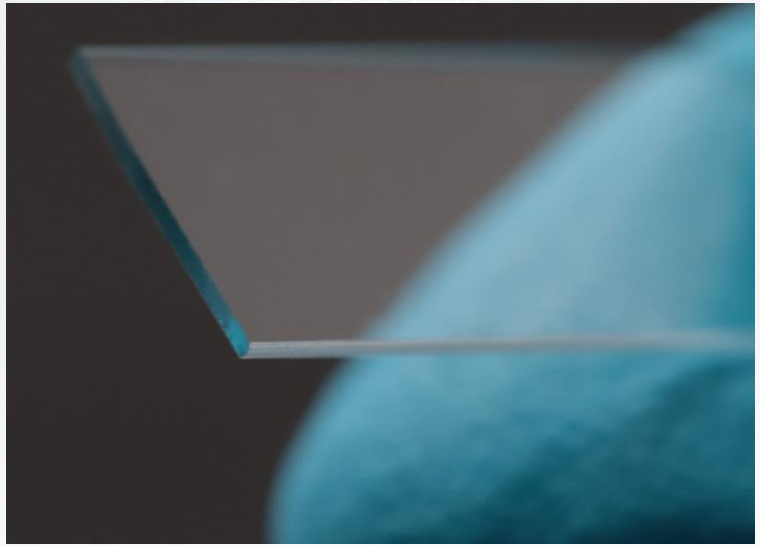
DPC ALLOWS FOR TOUGH COVER GLASSES WITHOUT MECHANICAL PROCESSING

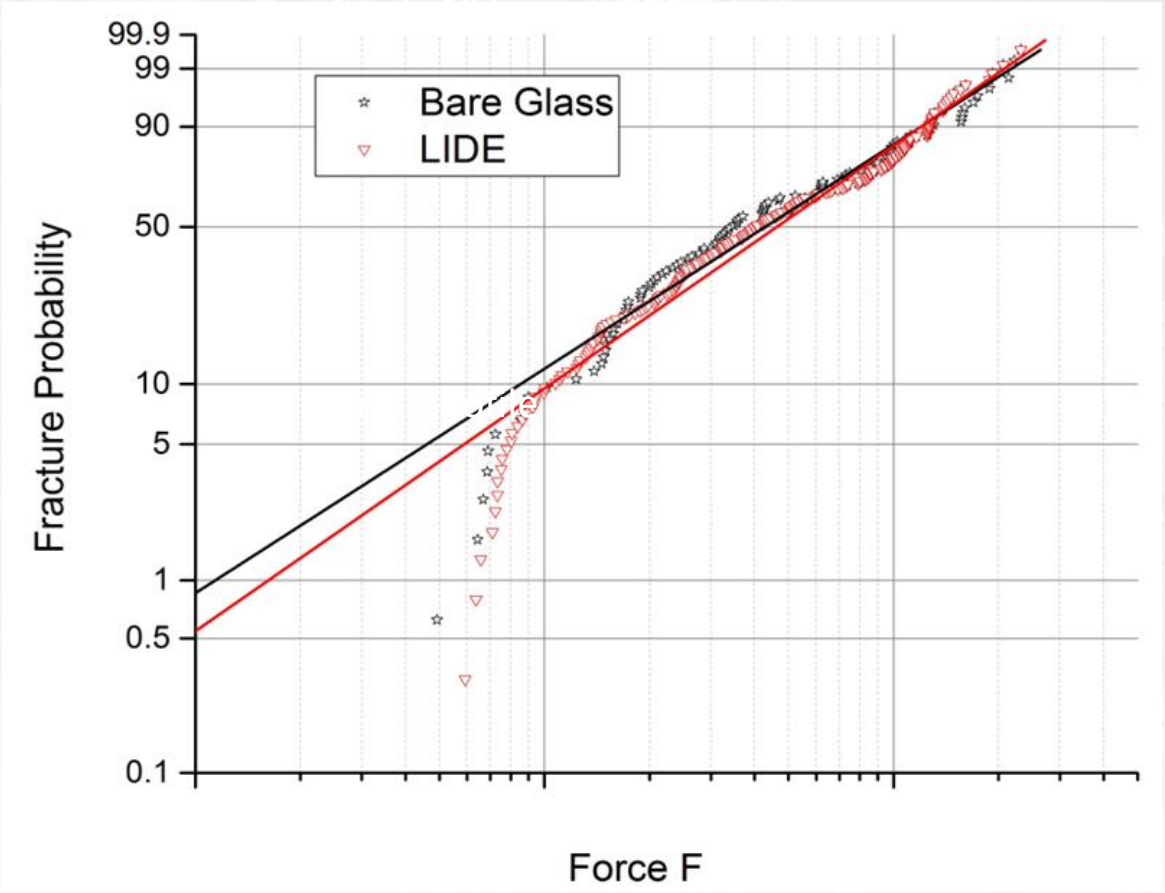


DIRECT PENCIL CUT (DPC)

ADVANTAGES SHOW UP IN A STRAIGHT WAY

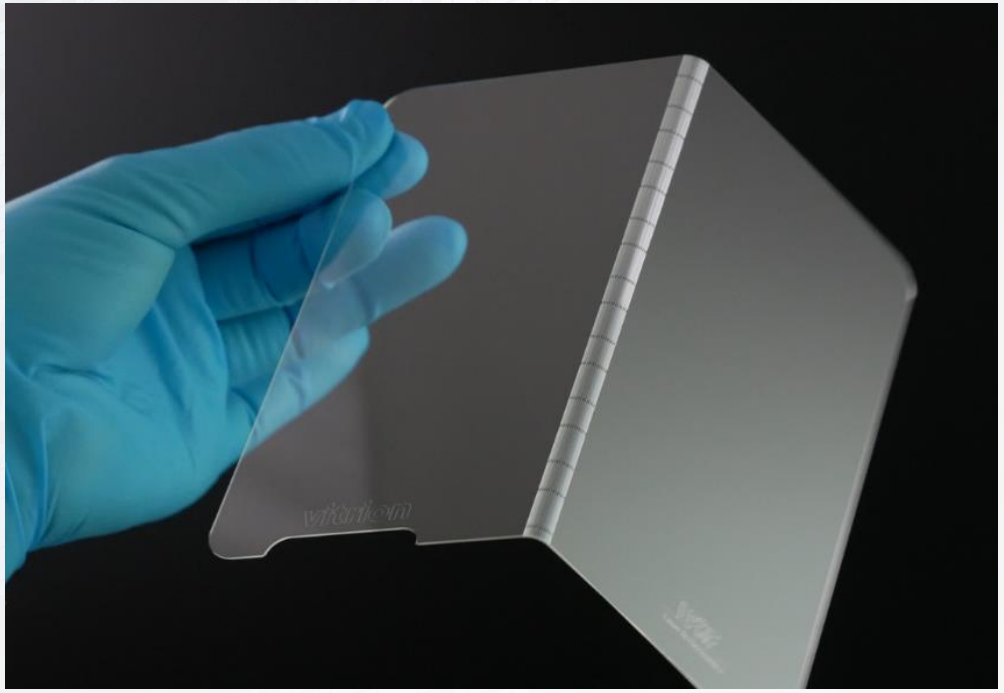
- LOWER COST DUE TO SHORTER PROCESS FLOW
- HIGHER DROP RESISTANCE DUE TO ABSENCE OF SUB-SURFACE DAMAGES
- DESIGN FREEDOM – VARIOUS PROFILE SHAPES

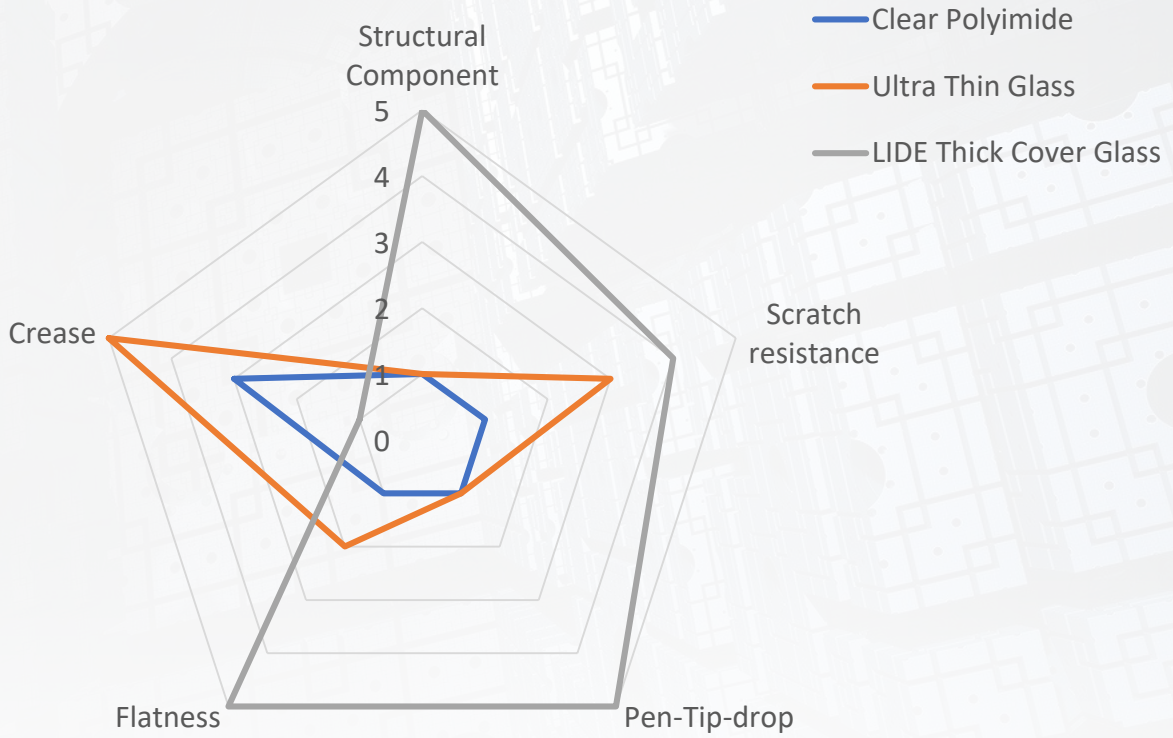




FOLDABLE COVER LENS

LIDE POINTS OUT A NEW WAY





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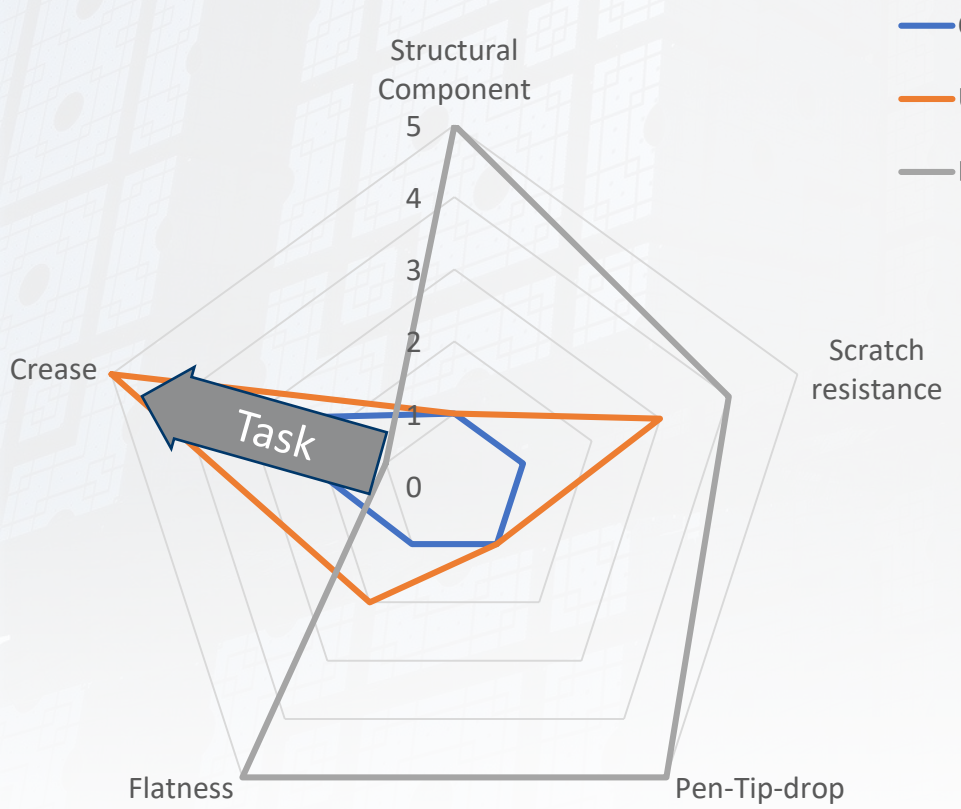
FOLDABLE COVER LENS

LIDE POINTS OUT A NEW WAY

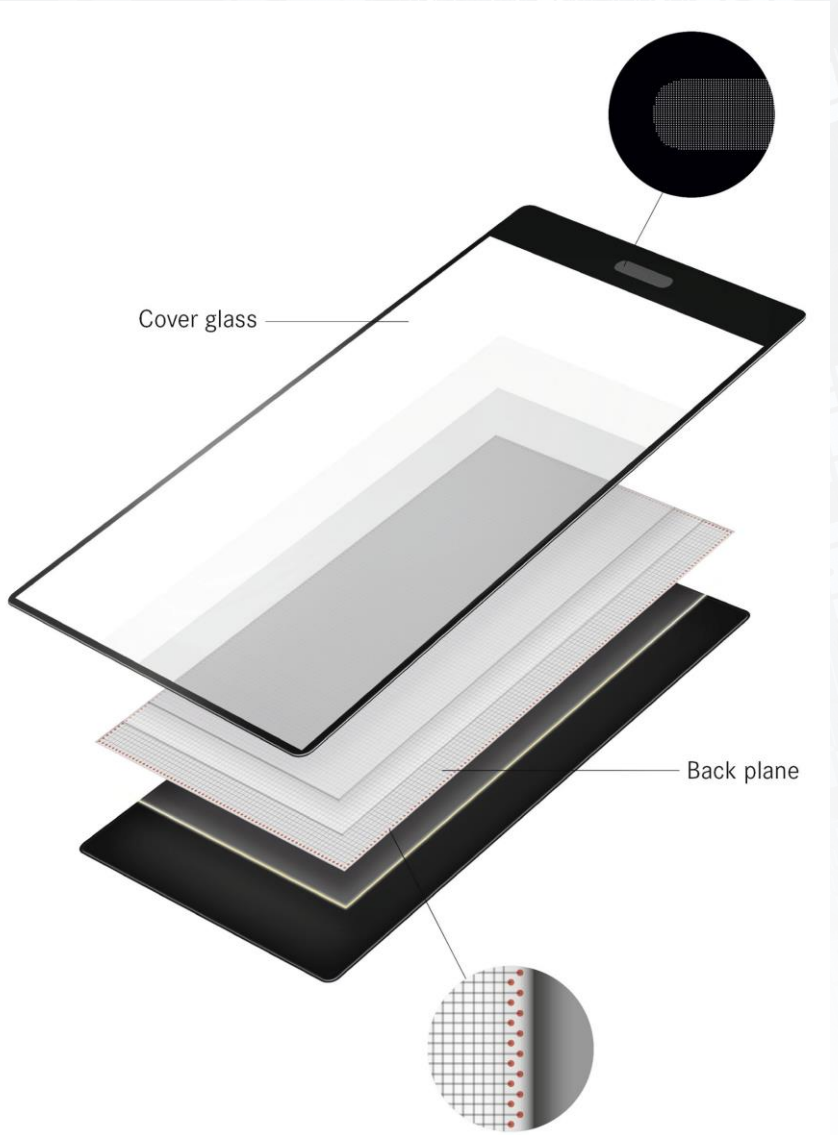
WORK IN PROGRESS



DISPLAY BACKPLANES

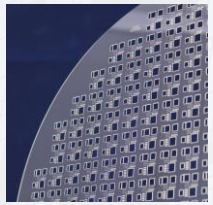
FURTHER GROWTH POTENTIAL

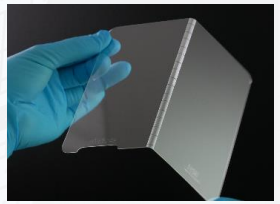
- FOLDABLE BACKPLANES
- THROUGH GLASS VIA BACKPLANES FOR MICRO LED DISPLAYS



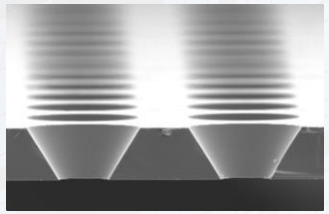
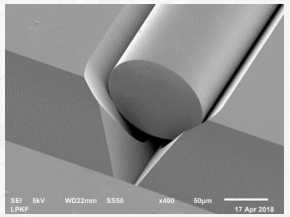
LIDE COMMERCIALIZATION STRATEGY

WE ADAPT FLEXIBLY TO DIFFERENT CUSTOMER SEGMENTS AND APPLICATIONS

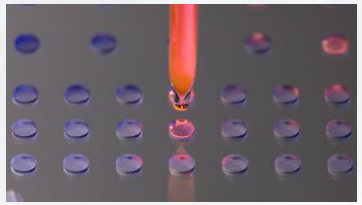


OEM Business

Manufacturing Service



LIDE Based Solutions

Examples

- Semiconductor
- Display

- Inkjet
- Wafer Level Optics

- Arralyze

VITRION MANUFACTURING SERVICE

CUSTOMER LIST REFLECTS A BROAD SPECTRUM OF THE TECHNOLOGY POTENTIAL

- CUSTOMER GROUPS:

  Inkjet, Life science, Shadow mask, Wafer Level Optics, Wafer Level Packaging, Photonics, Medical

- TECHNOLOGY QUALIFICATION IS SUPPORTED BY ENGINEERING LOTS THROUGH EXISTING LABORATORIES
- NEW FAB: TO ENSURE SUFFICIENT QUALITY AND CAPACITY

V07

LIDE FAB

MOVING IN OF EQUIPMENT

CLEAN ROOM

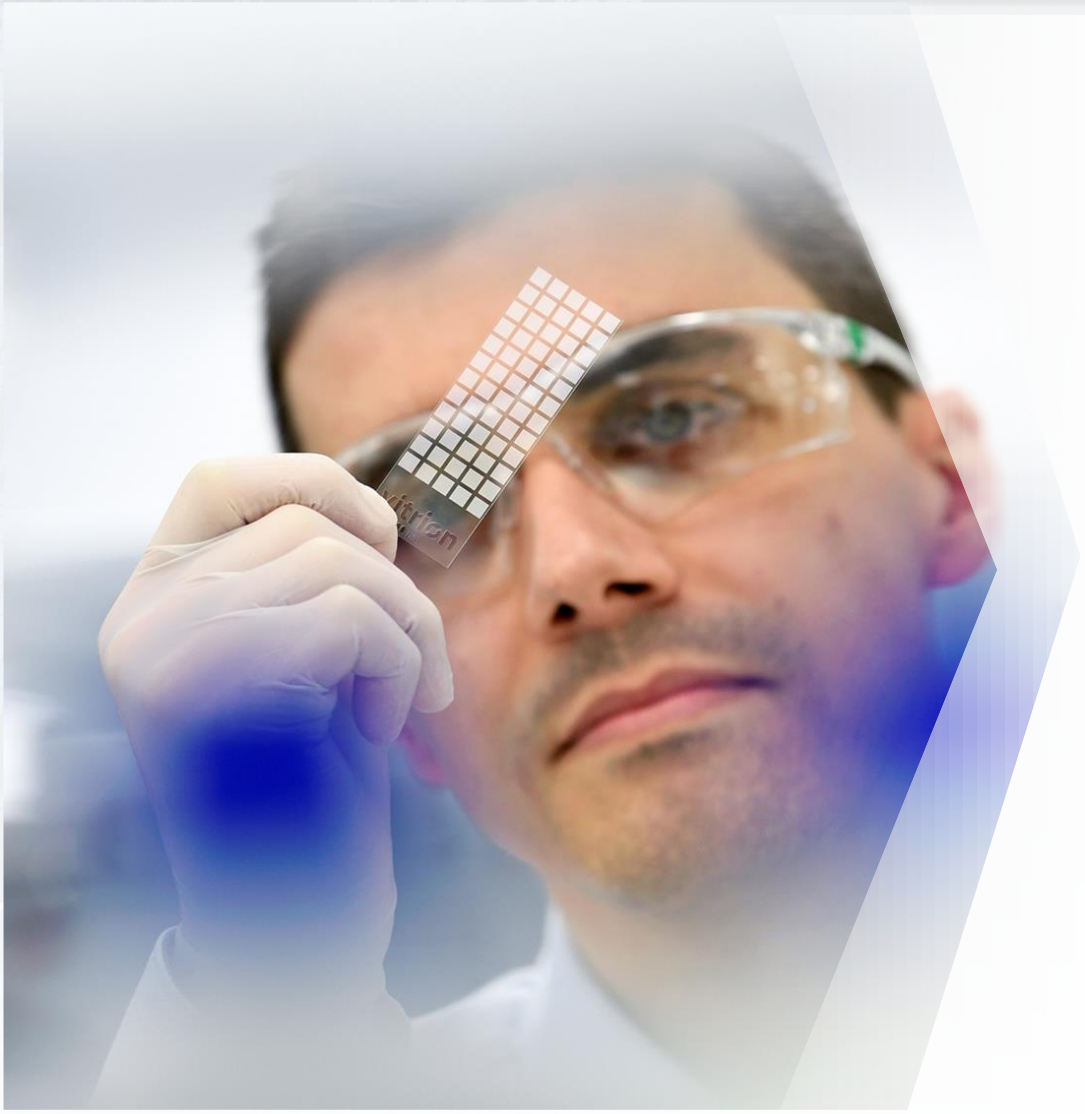
WET ETCH

CHEMICAL DELIVERY & WASTE SYSTEM

WET ETCH

EXECUTIVE SUMMARY

KEY TAKE AWAYS ON LIDE



- LIDE IS THE KEY TECHNOLOGY FOR FUTURE APPLICATIONS OF GLASS IN MICROSYSTEMS TECHNOLOGY
- ENABLES HIGHER QUALITY, LOWER COST AND NEW DESIGN CHOICES
- BROAD RANGE OF APPLICATIONS
- EQUIPMENT BUSINESS, MANUFACTURING SERVICE OR LIDE BASED SOLUTIONS DEPENDING ON APPLICATION
- SIGNIFICANT POTENTIAL FROM SEMICONDUCTOR AND DISPLAY THROUGH RUNNING PROJECTS
- FOUNDRY AND SOLUTION BUSINESS WILL BE ESTABLISHED STEP BY STEP AND INCREASE RECURRING REVENUE
- VITRION FAB WILL BE READY BY Q4/20, MEDICAL CUSTOMER PRODUCTION AUDIT SCHEDULED

THANK YOU!

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