

ANALYST BRIEFING AT PHOTONICS WEST 2023

**Display Manufacturing and Life Sciences
Now, Next, and Beyond**

February 1, 2023

CO-HOSTS



Dr. Chuck Mattera
Chair and CEO



Dr. Giovanni Barbarossa
Segment President Materials
& Chief Strategy Officer



Mary Jane Raymond
Chief Financial Officer

SPEAKERS



Dr. Kai Schmidt
Senior Vice President and
General Manager
Excimer Lasers Business Unit



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Senior Vice President and
General Manager
Solid State Lasers Business
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FORWARD-LOOKING STATEMENTS

This presentation contains forward-looking statements relating to future events and expectations that are based on certain assumptions and contingencies. The forward-looking statements are made pursuant to the safe harbor provisions of the U.S. Private Securities Litigation Reform Act of 1995 and relate to the Company's performance on a going forward basis. The forward-looking statements in this presentation involve risks and uncertainties, which could cause actual results, performance or trends to differ materially from those expressed in the forward-looking statements herein or in previous disclosures.

The Company believes that all forward-looking statements made by it in this presentation have a reasonable basis, but there can be no assurance that management's expectations, beliefs, or projections as expressed in the forward-looking statements will actually occur or prove to be correct. In addition to general industry and global economic conditions, factors that could cause actual results to differ materially from those discussed in the forward-looking statements in this presentation include but are not limited to: (i) the failure of any one or more of the assumptions stated herein to prove to be correct; (ii) the risks relating to forward-looking statements and other "Risk Factors" discussed in the Company's Annual Report on Form 10-K for the fiscal year ended June 30, 2022 and additional risk factors that may be identified from time to time in filings of the Company; (iii) the substantial indebtedness the Company incurred in connection with its acquisition of Coherent, Inc. (the "Transaction") and the need to generate sufficient cash flows to service and repay such debt; (iv) the possibility that the Company may be unable to achieve expected synergies, operating efficiencies and other benefits within the expected time-frames or at all and to successfully integrate operations of Coherent, Inc. ("Coherent") with those of the Company; (v) the possibility that such integration may be more difficult, time-consuming or costly than expected or that operating costs and business disruption (including, without limitation, disruptions in relationships with employees, customers or suppliers) may be greater than expected in connection with the Transaction; (vi) any unexpected costs, charges or expenses resulting from the Transaction; (vii) the risk that disruption from the Transaction materially and adversely affects the respective businesses and operations of the Company and Coherent; (viii) potential adverse reactions or changes to business relationships resulting from the completion of the Transaction; (ix) the ability of the Company to retain and hire key employees; (x) the purchasing patterns of customers and end users; (xi) the timely release of new products, and acceptance of such new products by the market; (xii) the introduction of new products by competitors and other competitive responses; (xiii) the Company's ability to assimilate recently acquired businesses, and realize synergies, cost savings, and opportunities for growth in connection therewith, together with the risks, costs, and uncertainties associated with such acquisitions; (xiv) the Company's ability to devise and execute strategies to respond to market conditions; (xv) the risks to realizing the benefits of investments in R&D and commercialization of innovations; (xvi) the risks that the Company's stock price will not trade in line with industrial technology leaders; and/or (xvii) the risks of business and economic disruption related to the currently ongoing COVID-19 outbreak and any other worldwide health epidemics or outbreaks that may arise. The Company disclaims any obligation to update information contained in these forward-looking statements, whether as a result of new information, future events or developments, or otherwise.

DISPLAY MANUFACTURING NOW, NEXT, AND BEYOND

Analyst briefing at Photonics West 2023

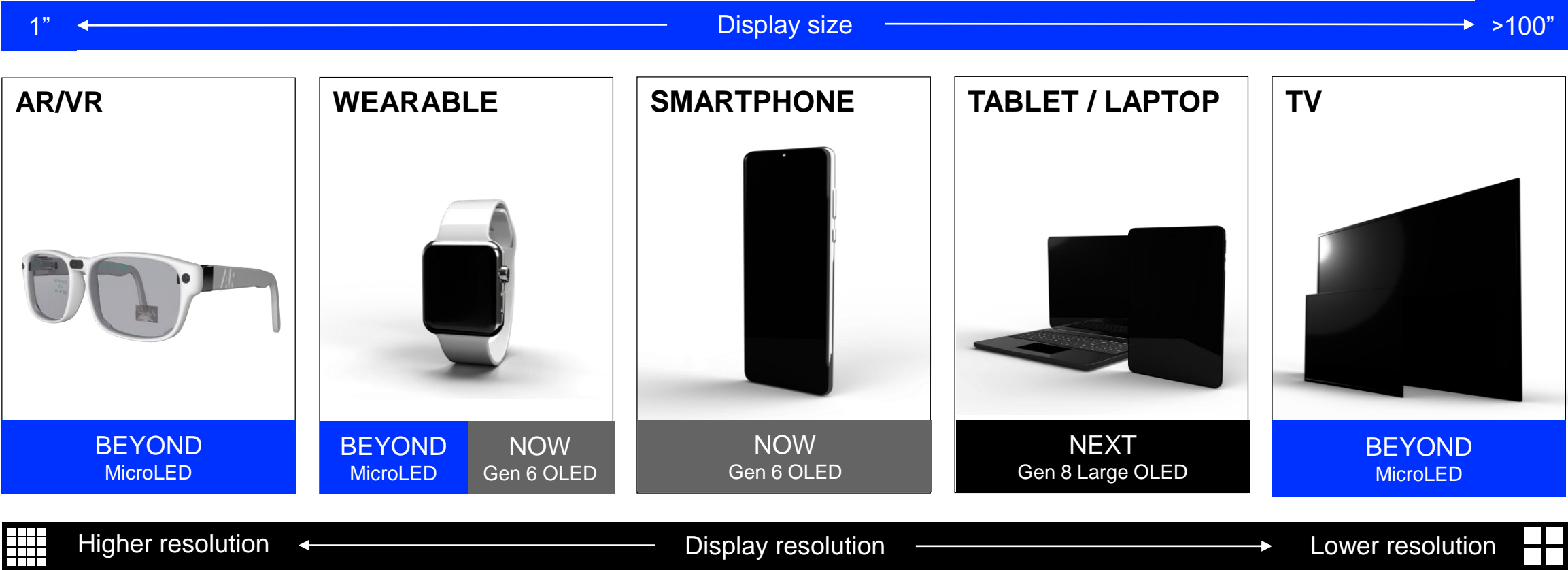
February 1, 2023

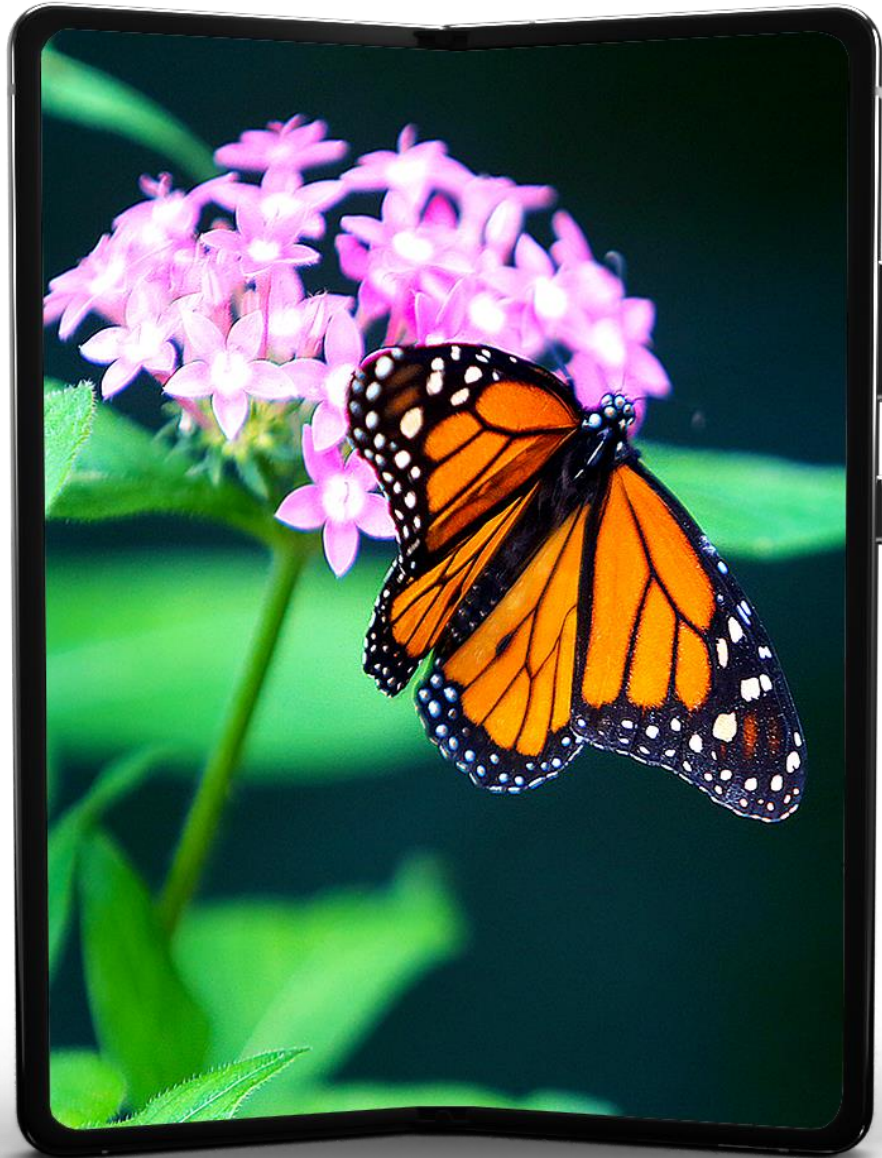
Dr. Kai Schmidt
Senior Vice President and General Manager
Excimer Lasers Business Unit



DISPLAYS: OUR WINDOW INTO THE CONNECTED WORLD

DISPLAYS: NOW, NEXT & BEYOND

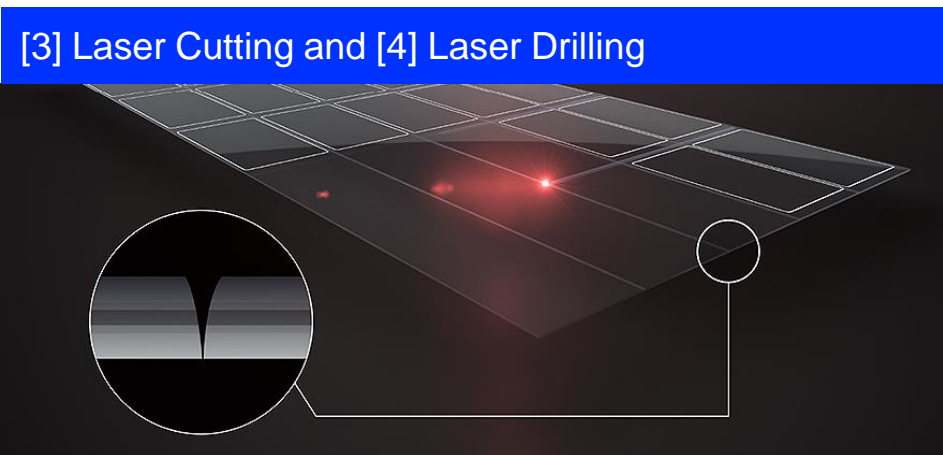
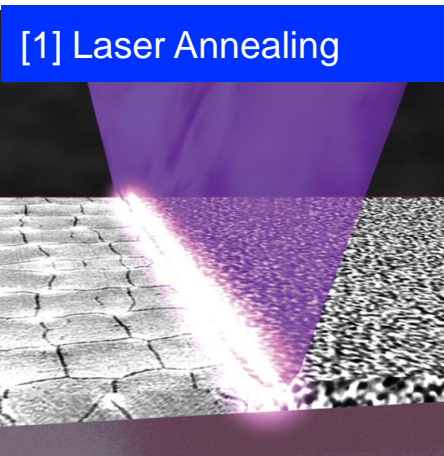




NOW: OLED DISPLAYS FOR SMARTPHONES

Rigid, flexible, and
foldable displays

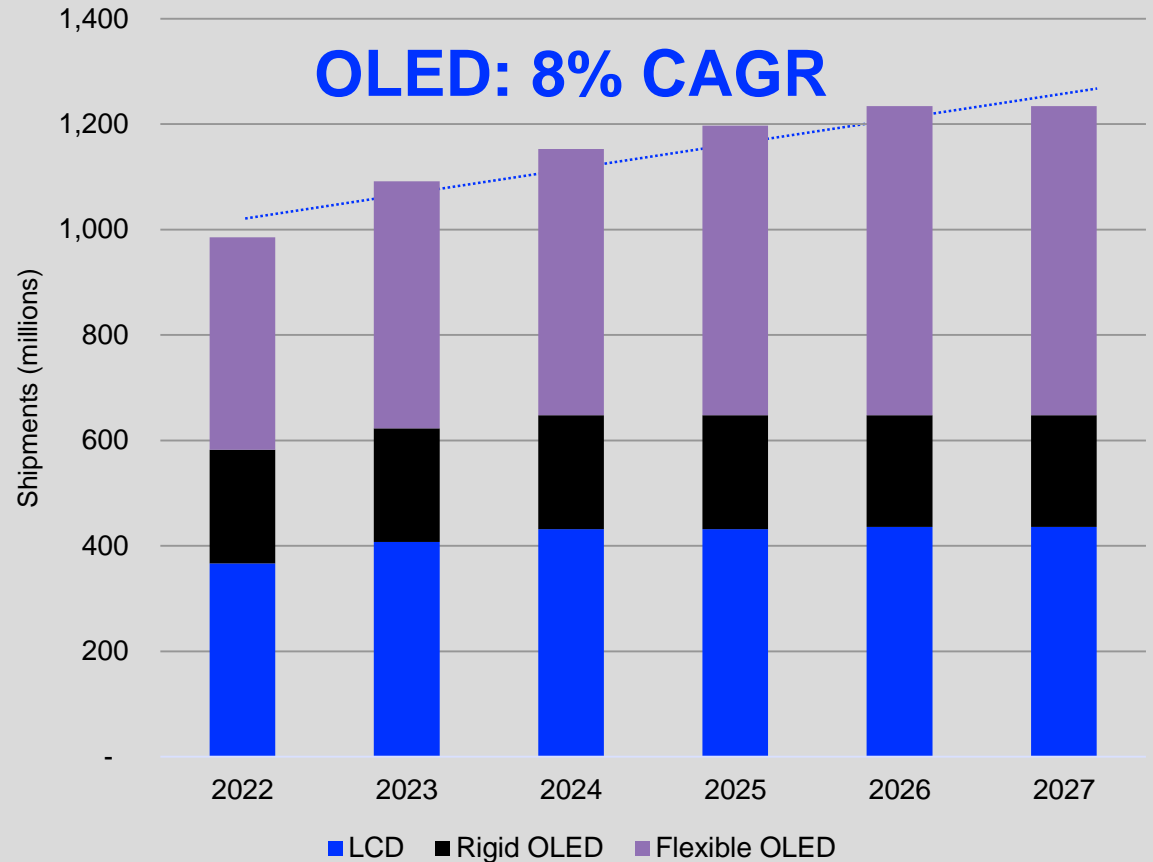
COHERENT PROVIDES LASERS FOR FOUR KEY OLED DISPLAY MANUFACTURING PROCESSES



OLED DISPLAYS IN SMARTPHONES AND IT DEVICES WILL CONTINUE TO GROW

- Smartphone displays will continue to dominate OLED market
- OLED adoption in smartphone is accelerating
- Share of flexible smartphone OLED displays will increase at 8% CAGR
- OLED IT displays, automotive will grow 50% CAGR over the coming 5 years
- The market will increase by the areas of displays by more than 30% over the next 5 years

Smartphone display (LTPS) long-term shipment forecast by technology



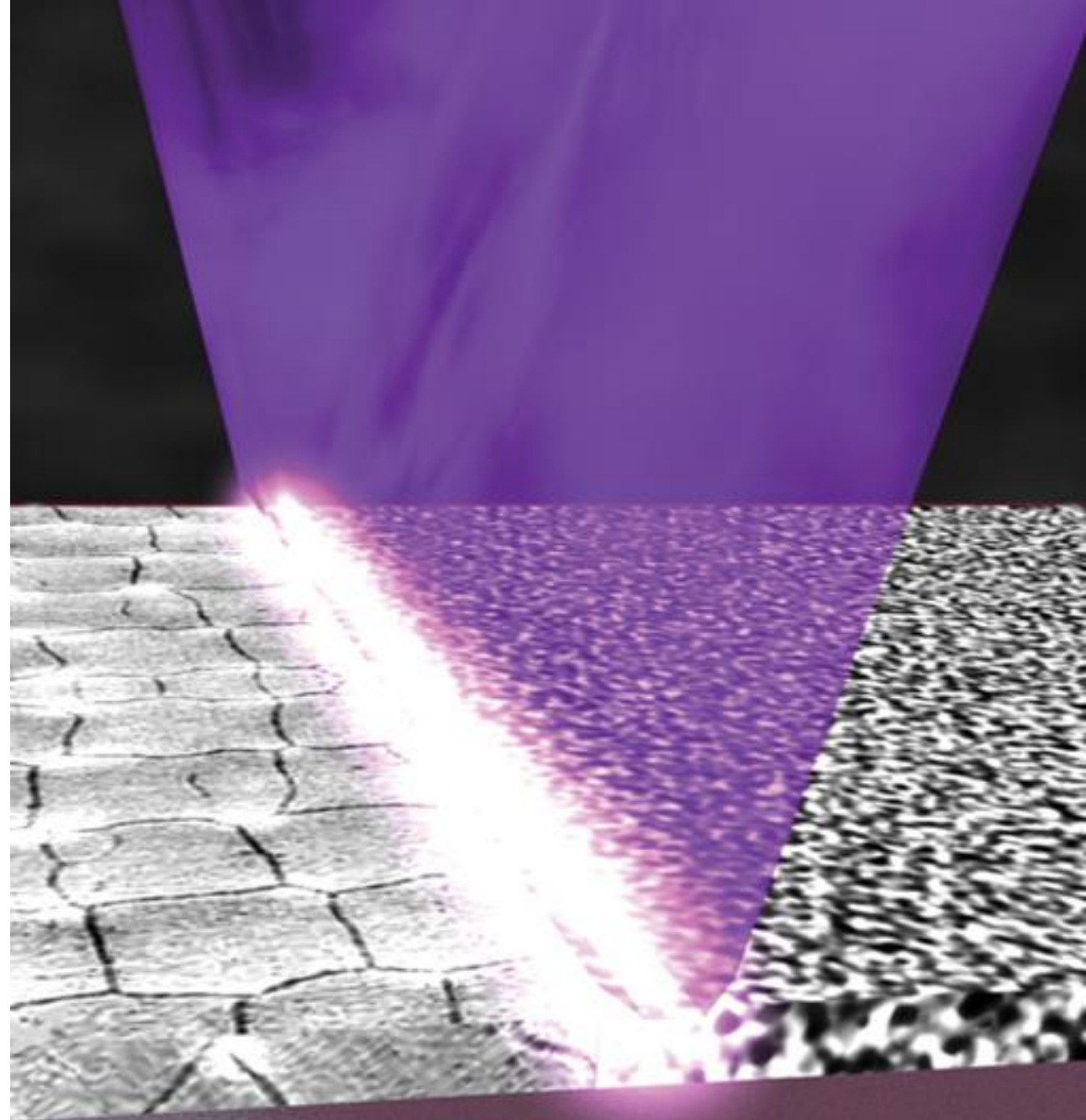
Source: Omdia, 2022

COHERENT IS A LEADER IN LASERS FOR OLED DISPLAY ANNEALING

- More than 300 excimer lasers installed
- Serving display fabs around the world, mainly in Korea and China
- Service revenue, including consumables, is in the range of 50-70% of overall revenue in display annealing

EXCIMER LASER ANNEALING

The de-facto standard and process of record for
annealing OLED displays worldwide





NEXT: LARGER OLED DISPLAYS

For tablets and laptops

MANUFACTURING LARGER DISPLAYS FOR IT DEVICES

The OLED industry is scaling up from Gen-6 to Gen-8 OLED display fabs:

- To achieve economies of scale
- To enable the proliferation of OLEDs in IT devices: tablets and laptops

First Gen-8 fabs expected to come online in late calendar year 2024, both in Korea and China





NEW SOLID-STATE LASERS FOR GEN-8 OLED DISPLAY ANNEALING: PYTHON

PYTHON:

- The result of 10 years of technology development for display manufacturing and the IoT
- Improved annealing quality
- Lowering the cost of annealing by 50%
- First demonstrator unit soon to be shipped to a major integrator in Korea



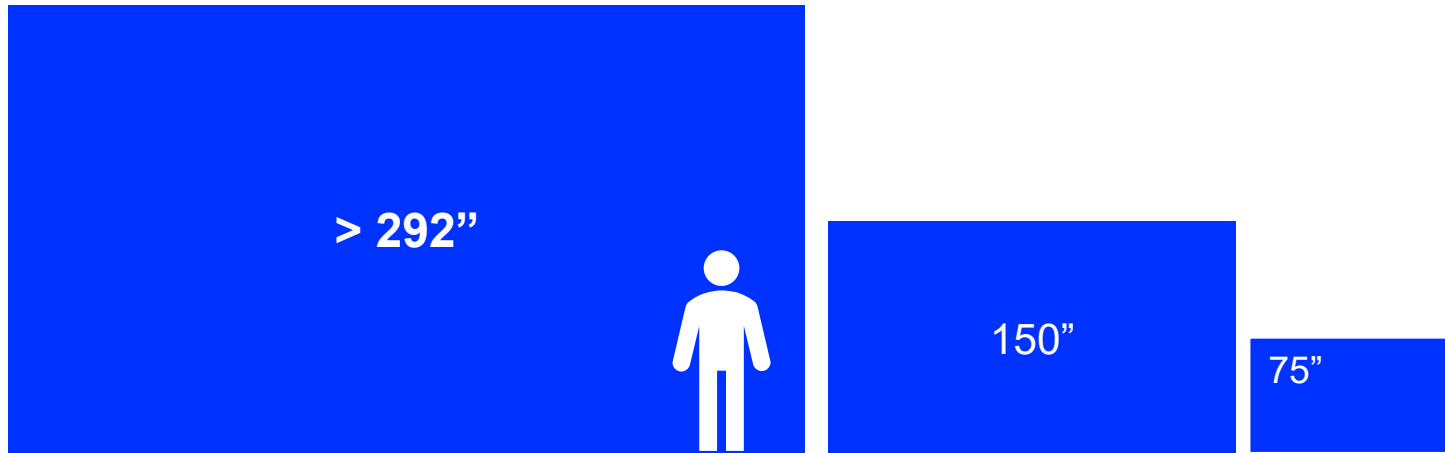
BEYOND: MicroLED DISPLAYS

For very large TVs and
tiny wearable displays

EMERGING APPLICATIONS FOR MicroLED DISPLAYS

Large Direct View (TV)

- High brightness
- High resolution
- Wide pixel pitch



■ Size of MicroLED Displays

Smart Watch

- Sunlight readable
- Low power
- Limited pixel count



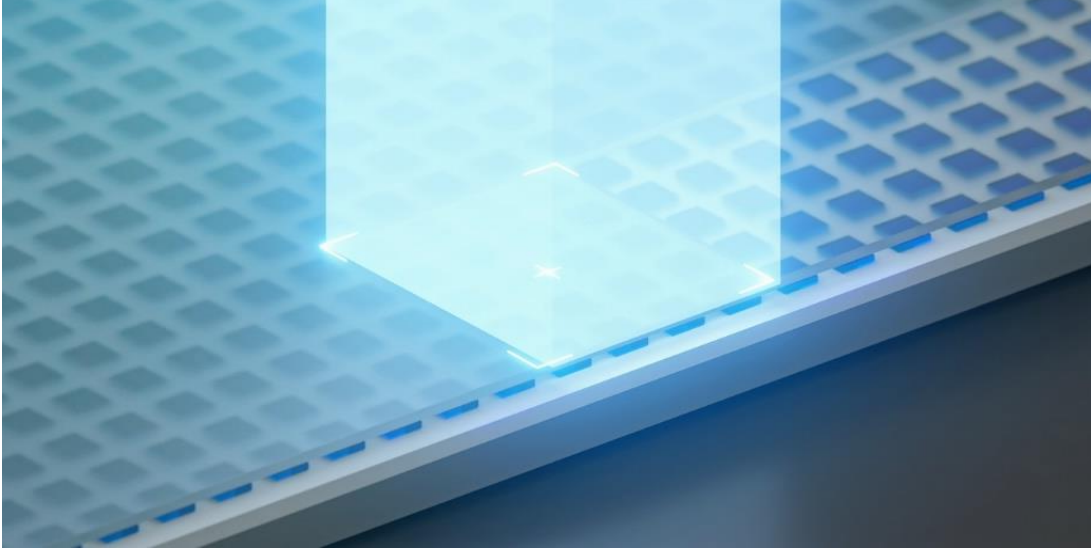
AR/VR

- Head mounted display
- High brightness
- Small size



MicroLED LASER PROCESSES

Laser lift-off



Optimized beam geometry to any MicroLED size and geometry.

Laser-induced forward transfer



Transfers MicroLED devices from the growth wafer or a temporary carrier to the display, changing the pitch. This process enhances productivity, reduces costs, and maintains high quality.

MicroLED DISPLAYS REPRESENT A SUBSTANTIAL INCREMENTAL OPPORTUNITY

Potential for \$1 billion of incremental revenue over the next ten years assuming:

- SAM is 10% of the TAM for micro-LED TVs larger than 60 inch
- Approximately 4M TVs are sold on average annually



DISPLAYS: NOW, NEXT & BEYOND


AR/VR



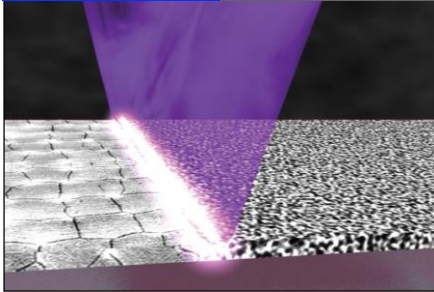
BEYOND
MicroLED



WEARABLE



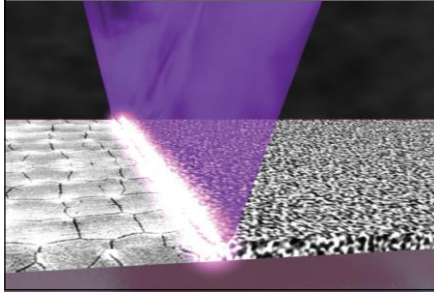
BEYOND **NOW**
MicroLED Gen 6 OLED



SMARTPHONE



NOW
Gen 6 OLED



TABLET / LAPTOP

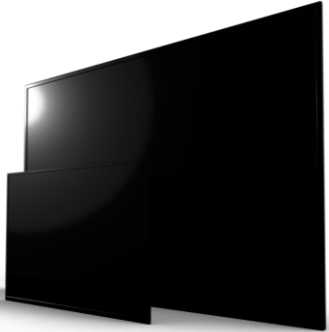


NEXT
Gen 8 Large OLED

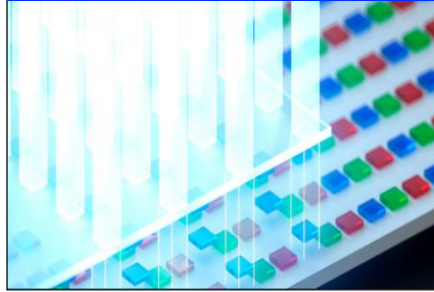
Gen 8
2200 x 2500 mm²
5.5 m²



TV



BEYOND
MicroLED



LIFE SCIENCES NOW, NEXT, AND BEYOND

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February 1, 2023

Dr Christopher Dorman
Senior Vice President and General Manager
Solid State Lasers Business Unit, Europe

OPPORTUNITY: THE AGING OF THE GLOBAL POPULATION

- World Health Organization: number of people over age 60 will increase from 1 billion in the year 2019 to more than 2 billion in 2050.
- Degenerative diseases, cancer, and Alzheimer's require challenging solutions
- Photonics technologies are driving an inflection point in modern medicine



THE THREE KEY ELEMENTS REVOLUTIONIZING MEDICINE

Biological Sample

- A cell
- A gene sequence
- Brain tissue

Fluorophore

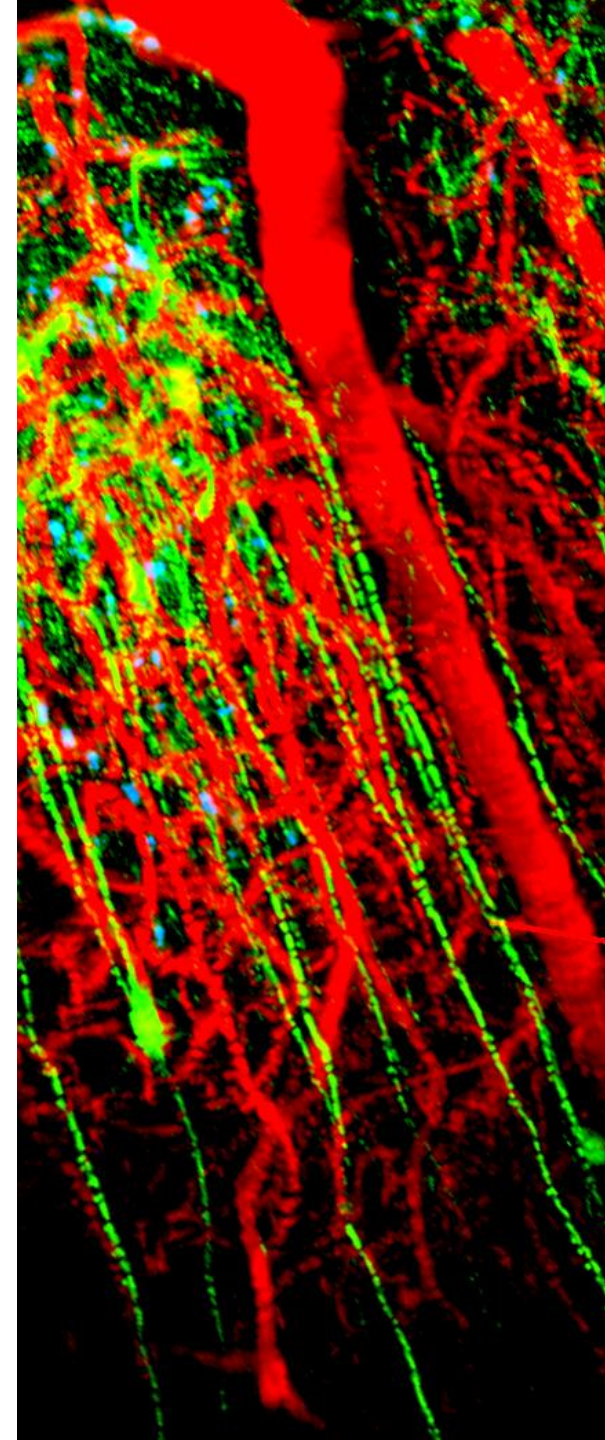
- Fluorophore added to a biological sample enables:
- Measurement
 - Imaging
 - Counting
 - Sorting

Photons

The perfect tool for biological measurement

Temperature Control

Three color imaging of mouse cortex.
Imaged with Coherent laser: Chameleon Ultra II.
Courtesy of Frank Debarbieux.



THE THREE STAGES OF TRANSLATIONAL SCIENCE

1

**Fundamental
research**

2

**Development of
instrumentation**

3

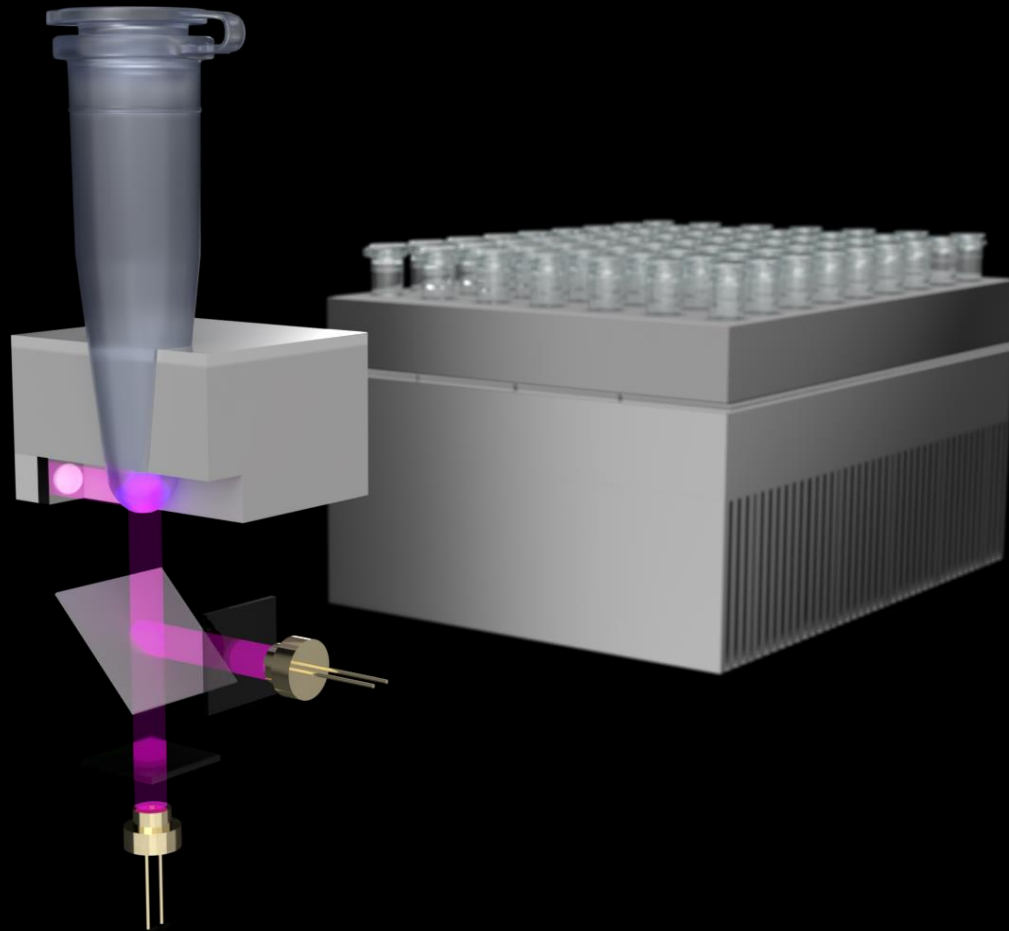
**Development of
therapeutics**



NOW: A TOOLKIT PERFECTED FOR COVID-19

PCR, cytometry, and
genetic sequencing –
a rapidly evolving toolkit

THE RISE OF PCR TESTING FOR COVID-19 IS JUST THE BEGINNING



The PCR Process:

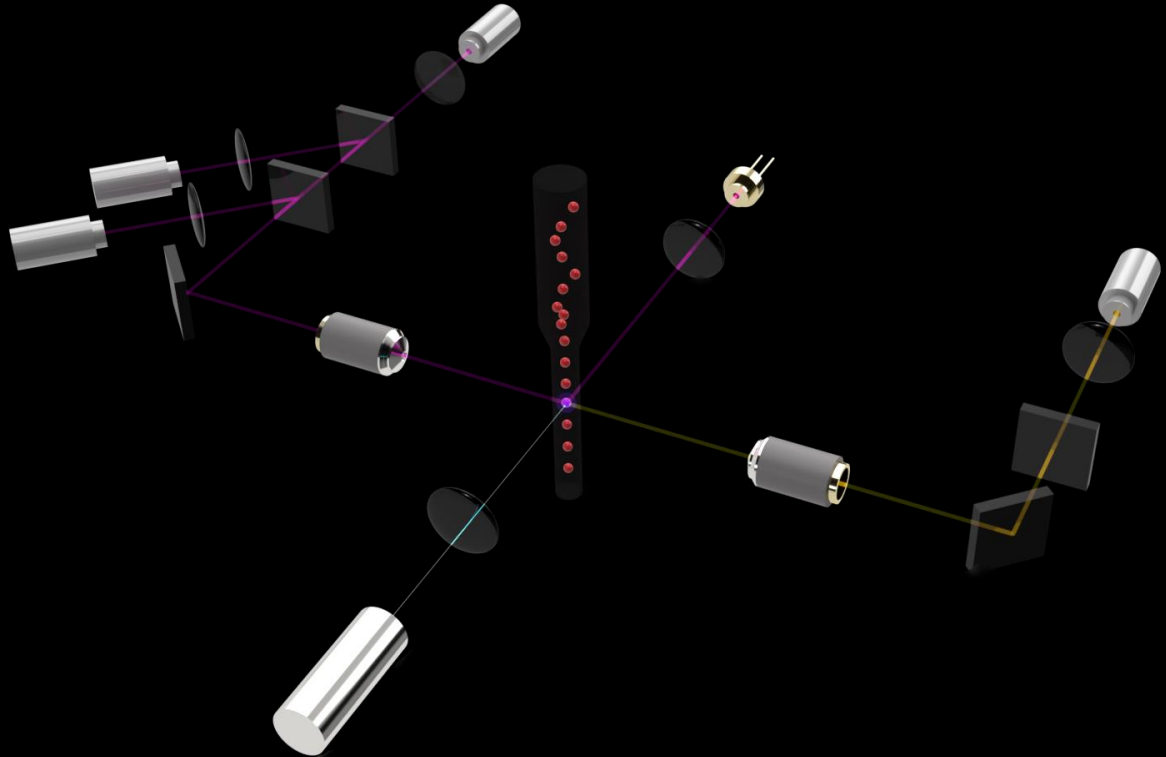
- Swab biological sample
- Probes tagged with fluorescent dye molecules
- Samples thermally cycled
- Fluorescence signal measured with time

February 2021 announcement

- Coherent to double of manufacturing capacity of thin-film filters for PCR testers within 5 years
- Coherent to ramp production of thermoelectric assemblies used to generate the highly controlled temperature cycles

COVID-19 AND FLOW CYTOMETRY

Flow cytometry: to quantify the effects of Covid-19 on the immune system



GENE SEQUENCING SARS-CoV-2

Sequencing of the virus genome has identified suitable targets for synthetic vaccines



NEXT: THE PERSONALIZATION OF MEDICINE

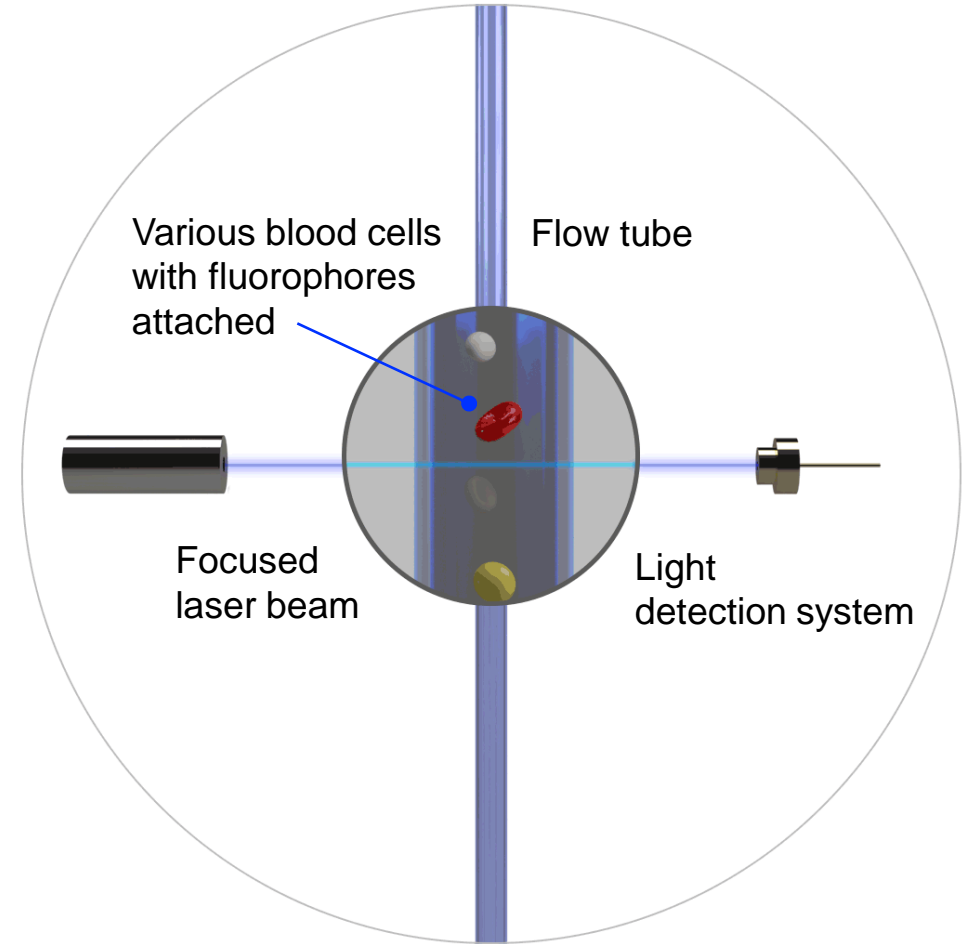
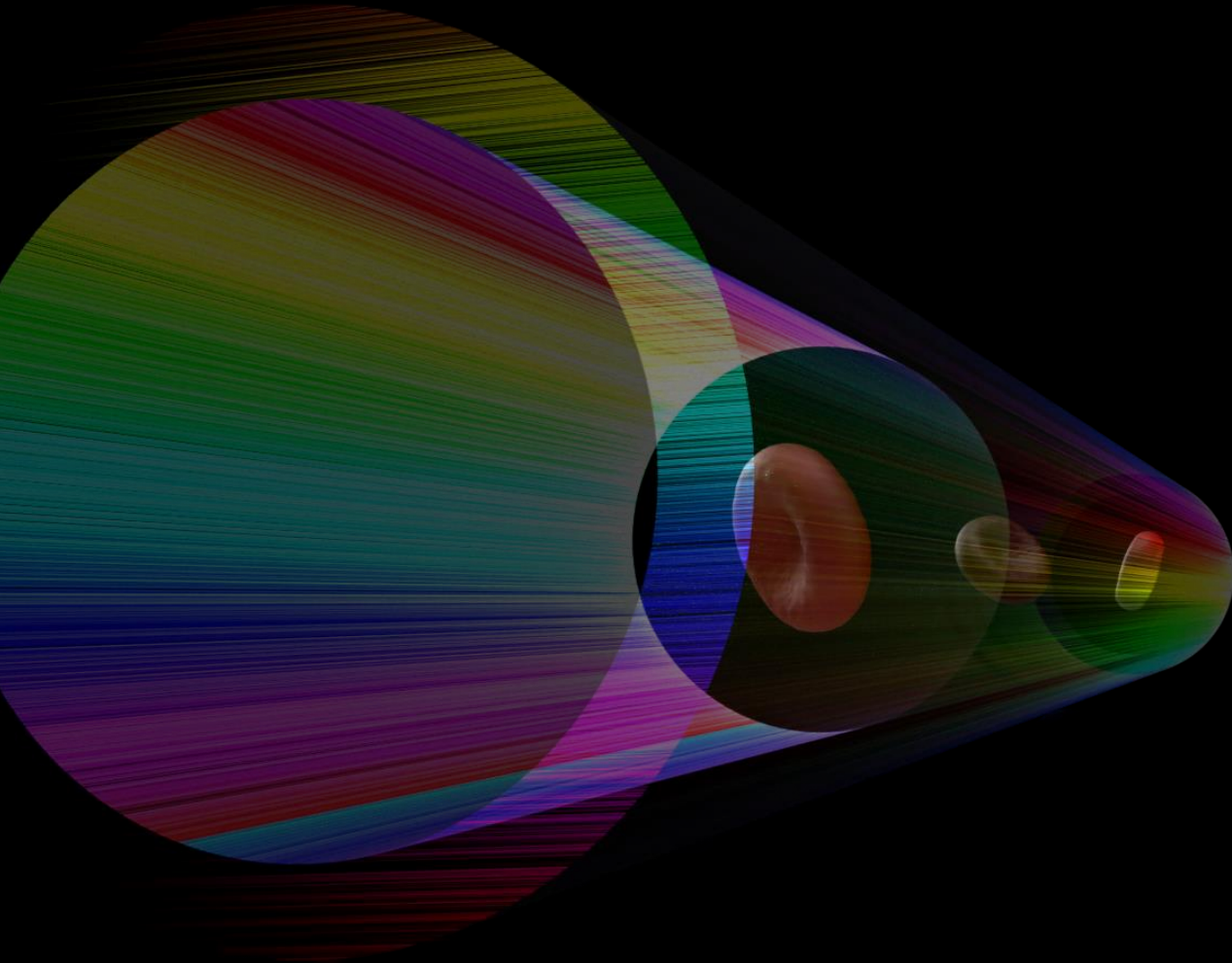
Leveraging the toolkit for
personalized medicine

TRANSITIONING FROM REACTIVE TO PREVENTIVE CARE

Personalized medicine requires biological and genetic analysis of the individual. The tools for this analysis are the same as those used in the fight against COVID. An attack strategy to tackle cancer starts with these systems.



FLOW CYTOMETRY



GENE-SEQUENCING

- Gene-sequencing instruments use similar lasers, and also have an extremely high throughput, but the fluorophores are designed to attach to specific base pairs of DNA, rather than specific cell locations
- The cost of sequencing a genome has dropped from millions of dollars to just a few hundred dollars
- Editing DNA is driving cures for diseases of aging and cancer, in many cases with just one dose





TOWARD MAKING CANCER A DISEASE OF THE PAST

Medicines which are designed by chemistry-based science will be replaced by individual treatments created by cell or gene-based approaches

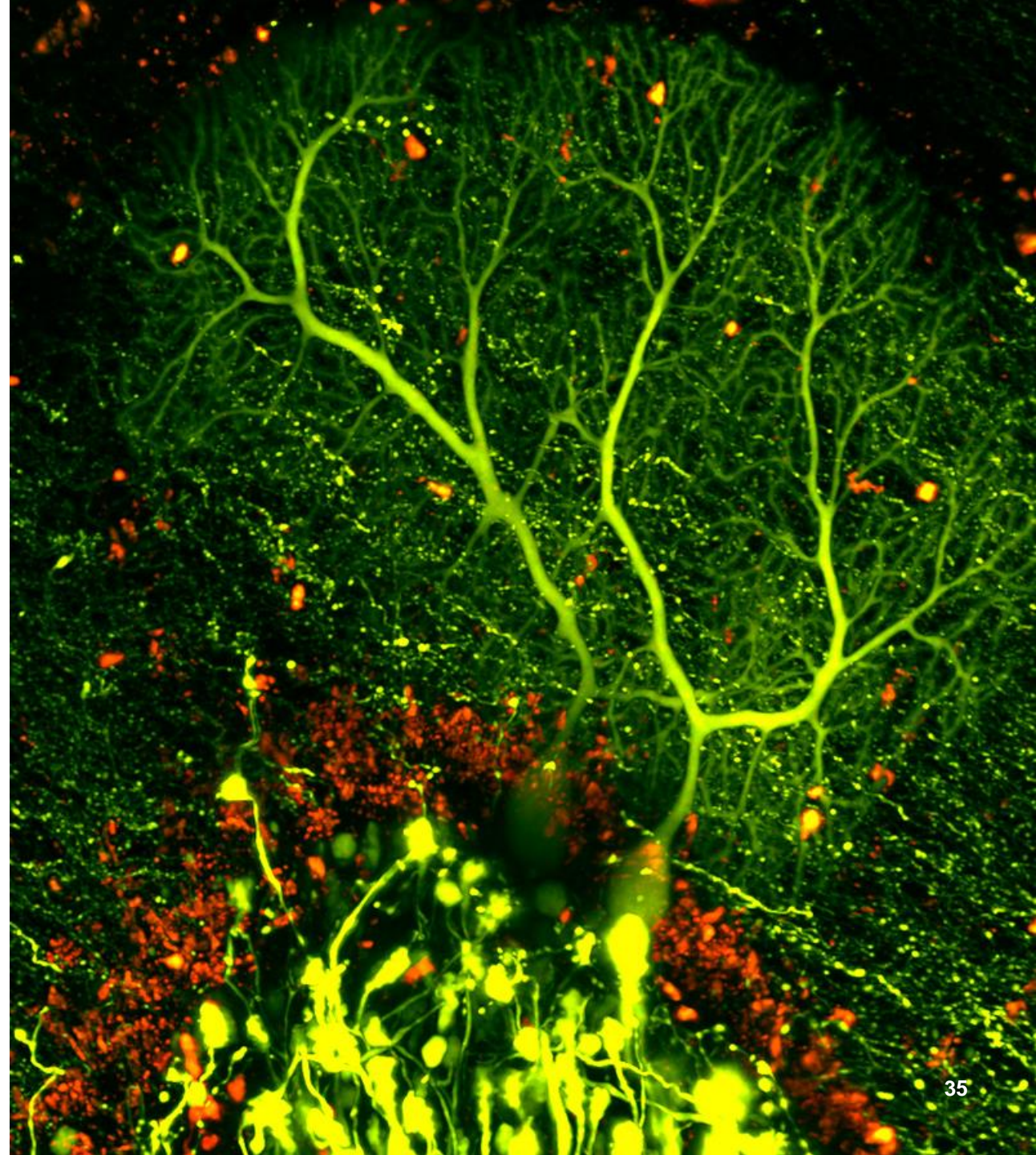
BEYOND: BRAIN MEDICINE

A revolution in brain
medicine is underway with
multiphoton microscopy
and optogenetics

THREE-DIMENSIONAL MULTI-PHOTON MICROSCOPY

Imaging the brain structure and its operation

Purkinje cells, mouse cerebellum.
Imaged with Chameleon Discovery TPC.
Courtesy of Dr. Y. Savchuk, Marquette University.



OPTOGENETICS

Moving from “read only” to “read/write” interaction with neurons to probe the brain functions of learning and memory

Axon laser used for GCaMP6s Ca⁺⁺ imaging in mouse following optogenetic stimulation.
Courtesy of A. Packer, University of Oxford.

LASERS FOR MAPPING THE BRAIN AND FORMING NEURAL PATHWAYS

Axon Laser

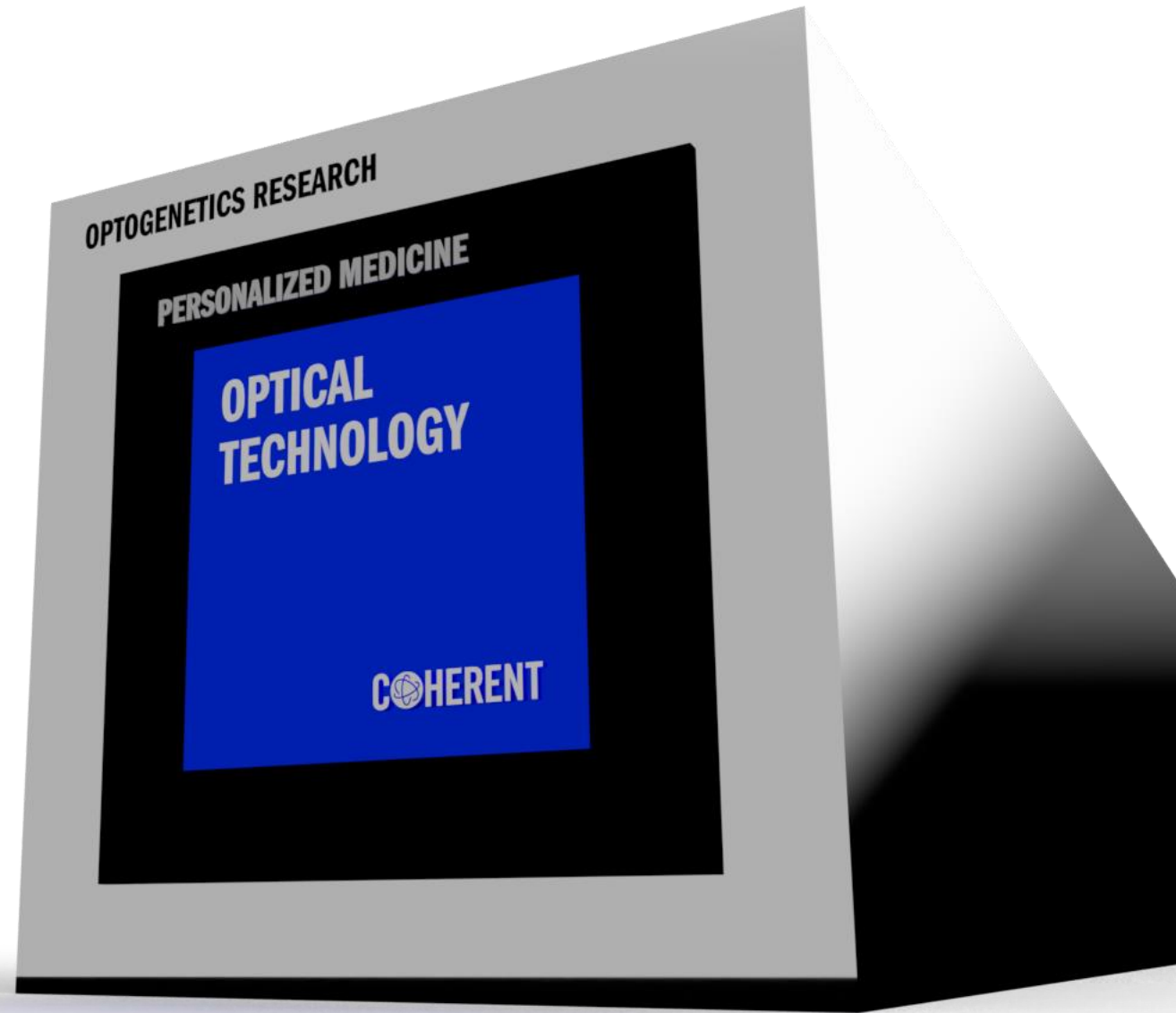


Chameleon Laser



Monaco Laser





HOW COHERENT FITS IN

FLOW CYTOMETRY WITH OBIS LASERS

- Broadest spectrum of laser colors on the market
- 20 years of miniaturization
- OBIS lasers enable the most capable, compact, and cost-effective instruments



MULTIPHOTON MICROSCOPY WITH COHERENT LASERS



Chameleon

- Over 3,000 lasers were shipped since 2007

Axon

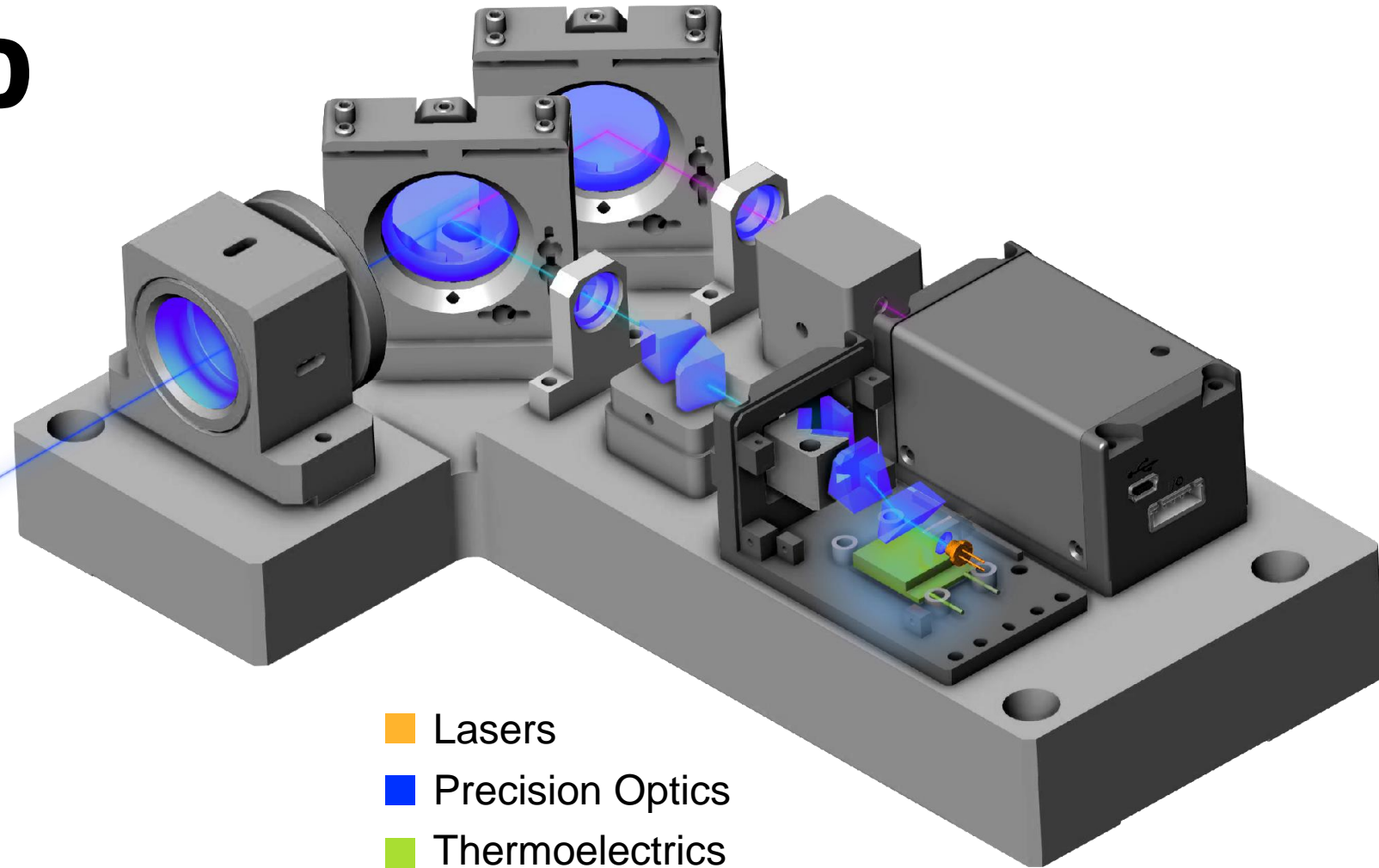
- A fraction of the cost and size of Chameleon
- Positions Coherent well as multiphoton microscopy and optogenetics translate from the lab and into biological instrumentation

FROM LAB INSTRUMENTATION TO POINT OF CARE TECHNOLOGY

Multiplying the installed base from centralized facilities to doctor's offices, or even the home

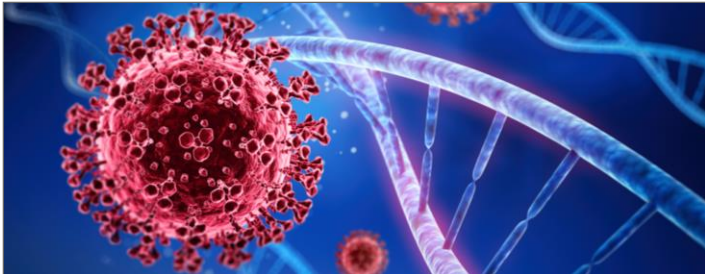


VERTICALLY INTEGRATED SOLUTIONS



- Lasers
- Precision Optics
- Thermoelectrics

A SIGNIFICANT GROWTH OPPORTUNITY IN LIFE SCIENCES



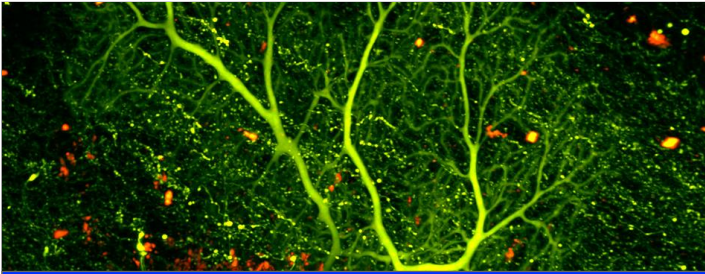
NOW

A new toolkit accelerated by Covid-19: PCR, flow cytometry and DNA sequencing



NEXT

Leveraging the new toolkit for personalized medicine



BEYOND

Multiphoton microscopy and optogenetics for brain medicine



Q&A

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COHERENT