iotech

Interactive Optical Technologies

Cutting Edge 3D printing

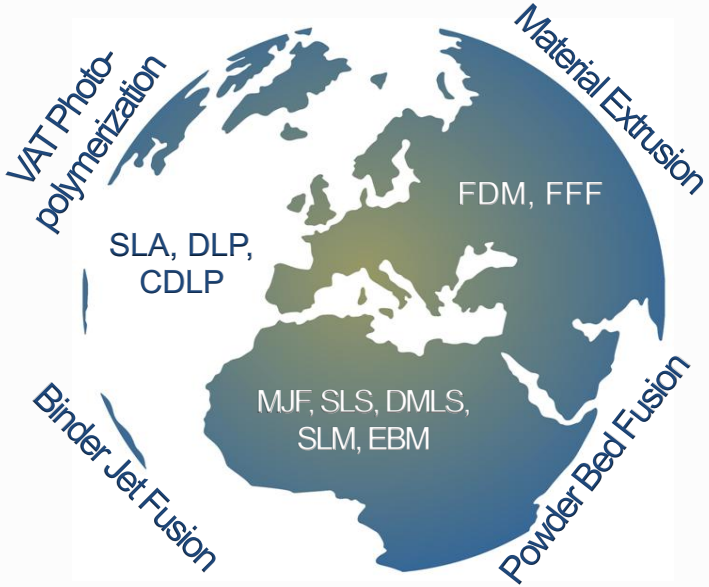
WISEE 2018

Introduction to iotech

Founded Q1 2016
R&D centre located in the
High-Tech-Park of the Hebrew University of Jerusalem

	Hervé Javice CEO	Atlas Capital, $4B fund of hedge funds, *board member*; Credit Suisse, European Corporate Equity Derivative business, *founder;* ESCP Europe; MBA, Harvard University
	Michael Zenou CTO	Orbotech, *lead researcher*, designed first-in-kind copper laser-printer; Israel Nuclear Research Center, *researcher*; Electro-optics engineer, JCT; Physics PhD, Hebrew University Jerusalem

Today, additive manufacturing focuses on producing functional parts made of single materials



MISSING

Versatile single *and* poly-material functional object printer

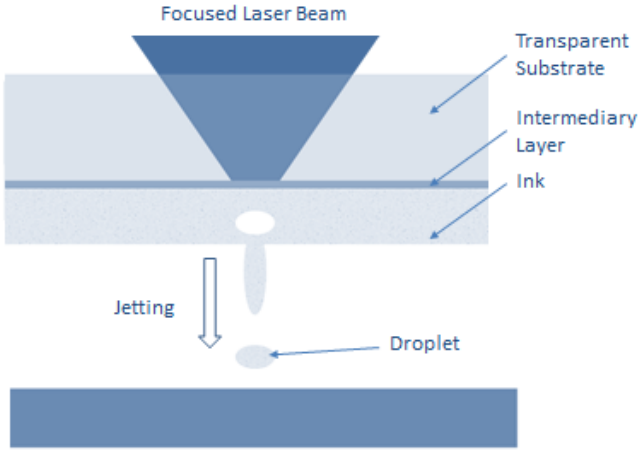
MISSING

High-resolution deposition of high-viscosity materials

iotech LAD™ technology

A tool to create new types
of objects in **polymer**, **metal**,
ceramic & even **bio-materials**

High-performance LAD™ technology



*Laser Assisted Deposition, TM Pending

Heat-free jetting

Laser can jet materials with

3,000 x

higher viscosity than Inkjet

Space friendly

- Prints without gravity
- Integrates post-processing
- Wide range of applications
- Liquid materials, no powders
- Low power consumption

Today multi-material printing is “nozzle constrained”

Nozzle based jetting

Nozzle size
Viscosity
Speed
Resolution

are all *inter-related*, impact on clogging and reliability

Tomorrow … it will be free of viscosity constraints

Nozzle based jetting

Nozzle size
Viscosity
Speed
Resolution

→ are all *inter-related*, impact on clogging and reliability

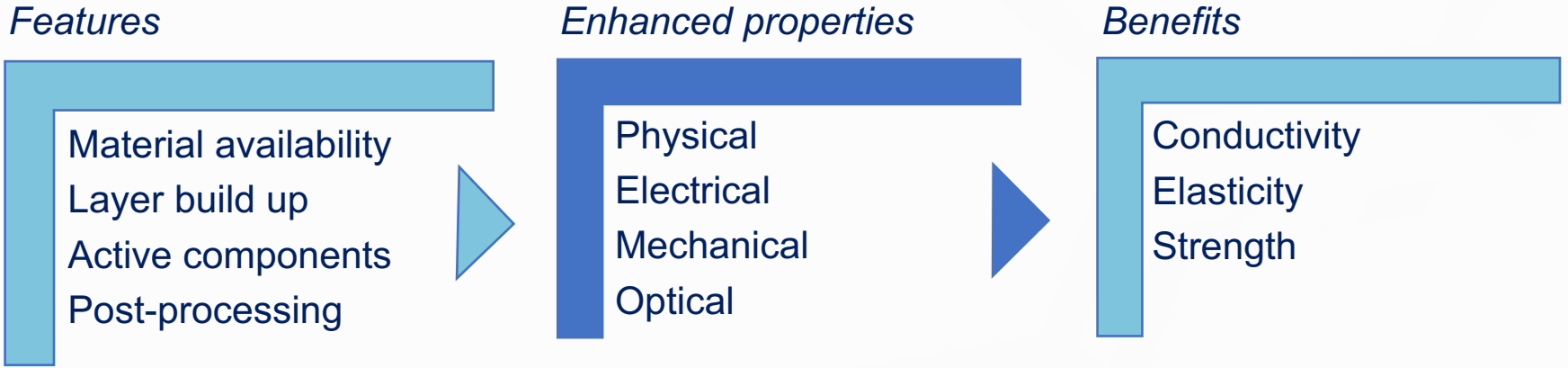
Nozzle free laser jetting

Viscosity
Speed
Resolution

→ are all independent variables

Laser jetting: the end of clogging

High-viscosity enhances AM



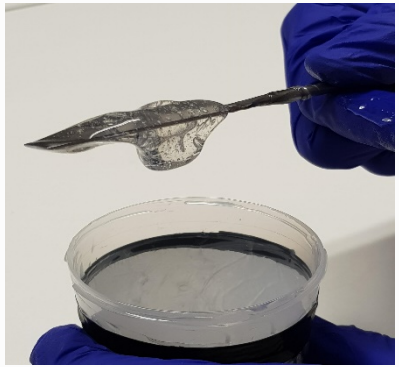
Better performing final product

Cutting-edge LAD™

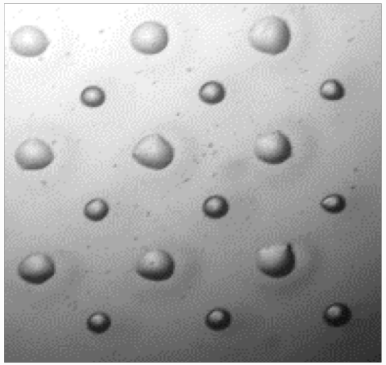
- Alpha-system
- 2 patents granted and 10 provisional patents
- Cooperation with leaders in dental and electronics

Use case 1: LAD™ jetted **elastomer**

Need	3D print elastomer with high elongation
Challenge	High elongation (200%+) requires high viscosity material
Solution	LAD prints elastomer with superior elongation properties

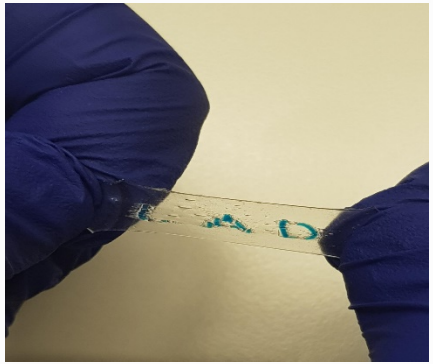


Uncured elastomer



80µm & 35µm droplets

Printed slab



Elongated slab

Use case 2: jetted **elastomer & metal paste**

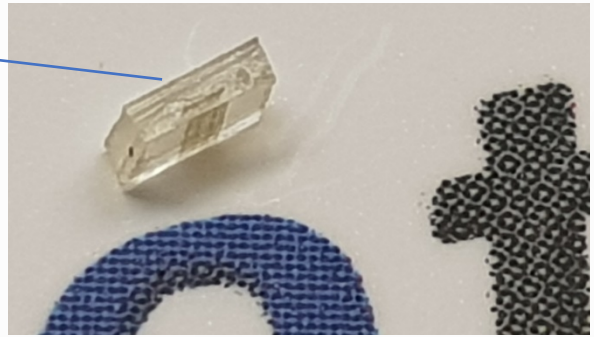
Need	Integrate conductors & electronics Print metal paste instead of ink
Challenge	Elastomer & metal with single printer
Result	Multi-layers in 20µm resolution

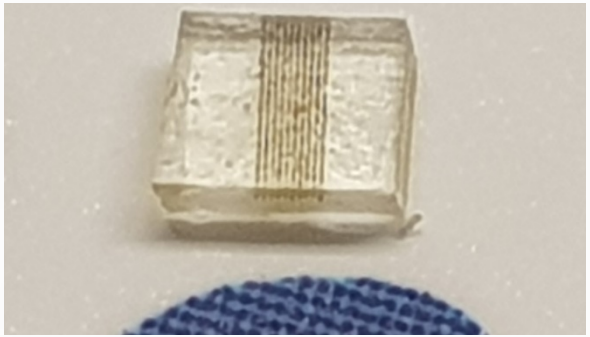
Why metal paste?

→ Less dispersion, better properties

→ Faster, easier post processing

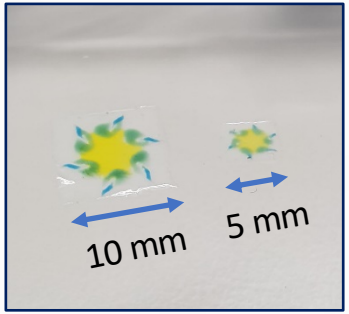
→ No expensive nanoparticles

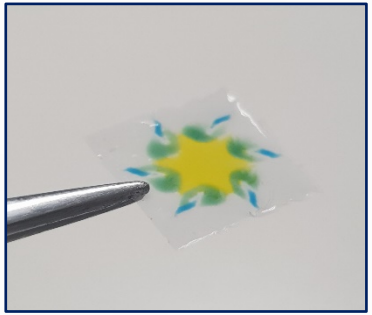


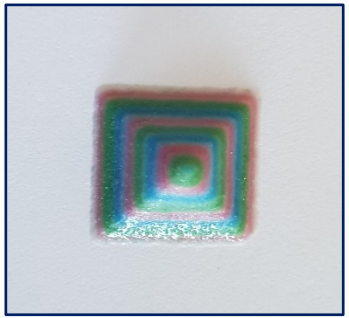


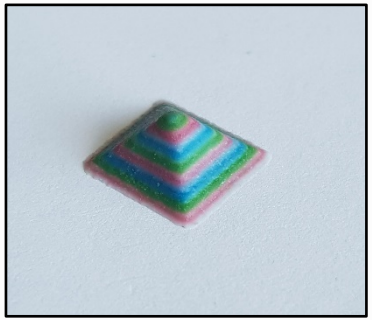
Use case 3: jetted **high strength polymers**

Need	Print multiple high quality photo-polymers
Challenge	Complexity of mixing material with DLP/SLA
Solution	LAD prints and mixes photo-polymers



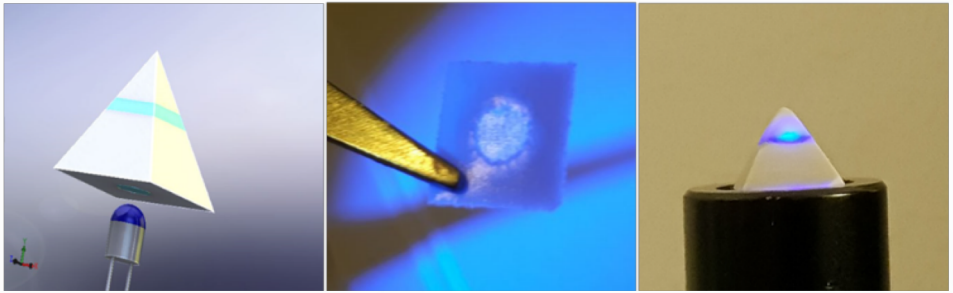






Use case 4: jetted **polymers in ceramics**

Need	Embedded light-guides, a significant technological development. These sensors enable reliability tests of built-in parts.
Challenge	Complexity of mixing different types of material
Solution	Made of transparent photopolymer, the light-guide is embedded in a ceramic matrix. Both materials are printed at the same time.



Gateway to material open source

Today

- Manufacturers' materials
- Low viscosity materials

Tomorrow

- Open source
- Very wide range of materials
- Mixed materials

The ultimate “Tool Box” for Manufacturing

- Compact and versatile
- Fully integrated process
- Multi-viscosity and resolution
- Manufacturing functional objects
- Using most off-the-shelf materials
- Multiple materials simultaneously
- Capable of both 2D & 3D printing

Polymers, metals, ceramics, silicones, solders …

iotech

Industrial materials printed in high resolution

Thank you

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