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Enabling the Digital Printed Electronics Revolution in Mass Production

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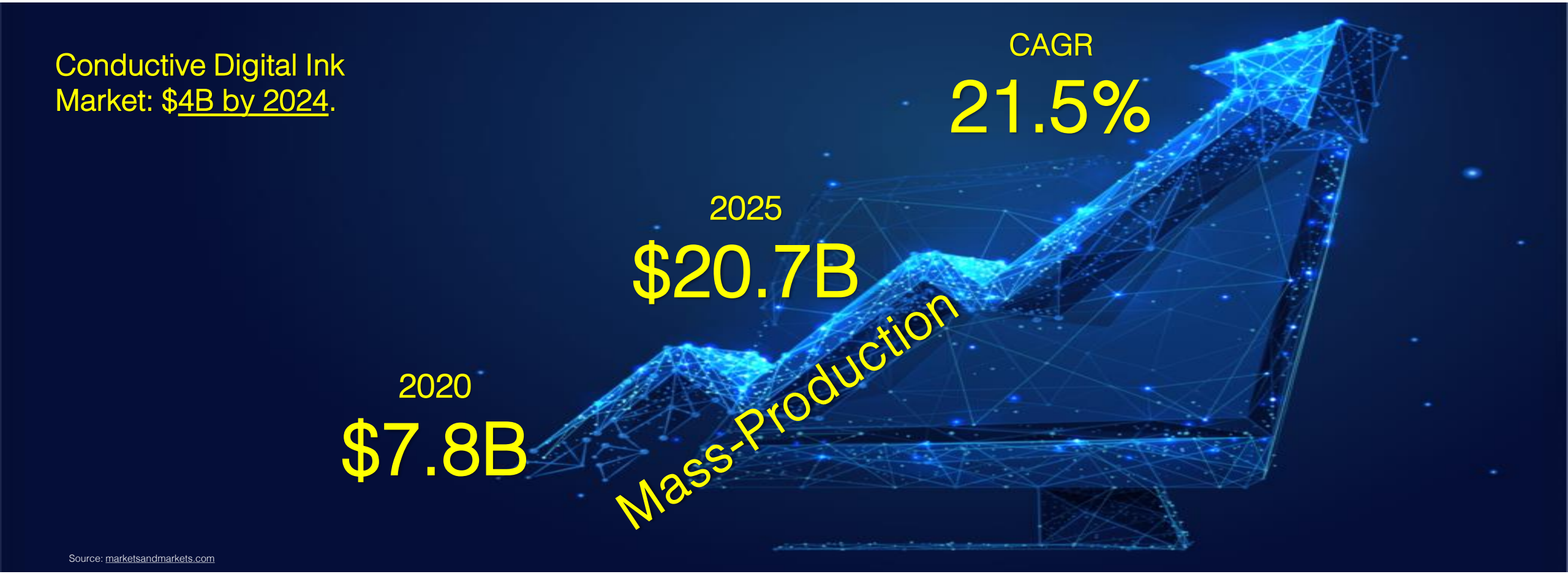
Current Massive Wave: Electronics Everywhere

PV Nano Cell's Digital Printing Solutions Enable Electronics Everywhere

- Smart Automotive
- Solar Cells
- IoT Applications
- Wearable Technologies
- Flexible Electronics
- Medical Devices
- Smart Packaging
- Self-Driving Cars

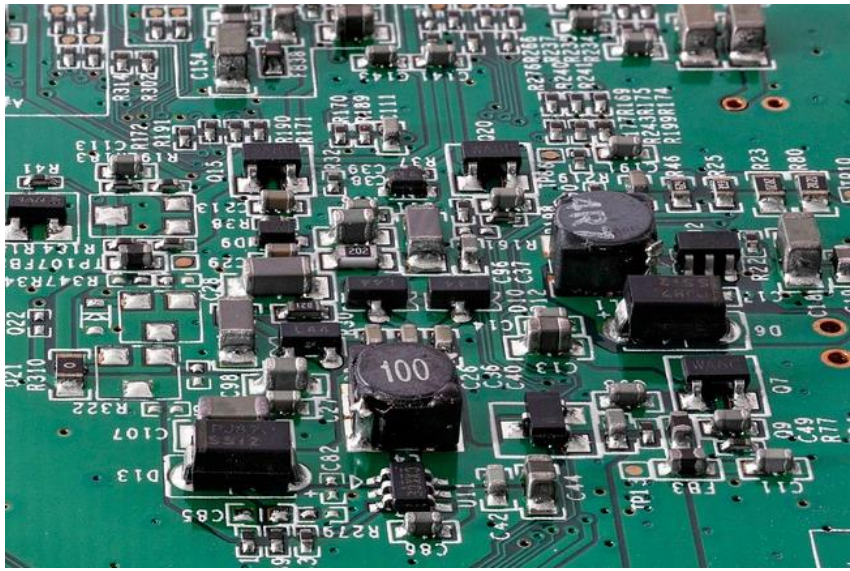
Digital Printed Electronics is a Great Promise!



PV Nano Cell Already Enables Printed Electronics in Massive Markets

Automotive Glass
$2B, CAGR 5.6%

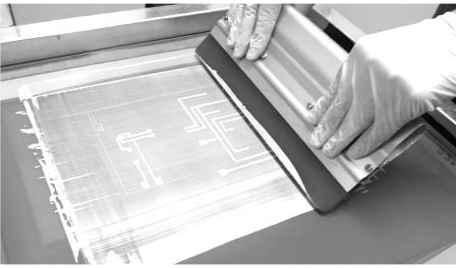
Solar
$11B, CAGR 4.3%



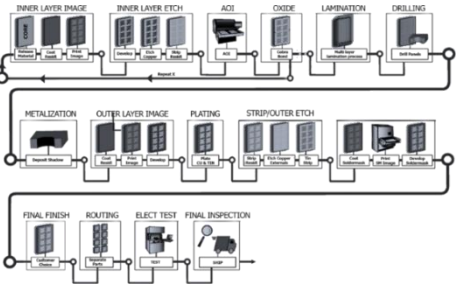
Embedded Passive Components*
$11.7B, CAGR 7%

* Embedded Passive Components: Resistors, Capacitors and Coils.

Why Go Digital?



Traditional Analog Printing



Traditional Etching

Constant Innovation

Shorter Time to Market

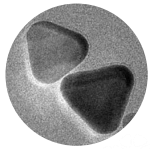
Superior Performance

Digital Printing

Best Cost - Performance

On-demand Custom Manufacturing

New Designs & Flexibility



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Sicrys™ Digital Inks
Single Crystal Nano Inks

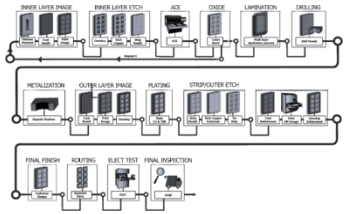
New, Electronics Everywhere

Yet Analog Processes still Dominate Mass-Production

Manual Screen Printing

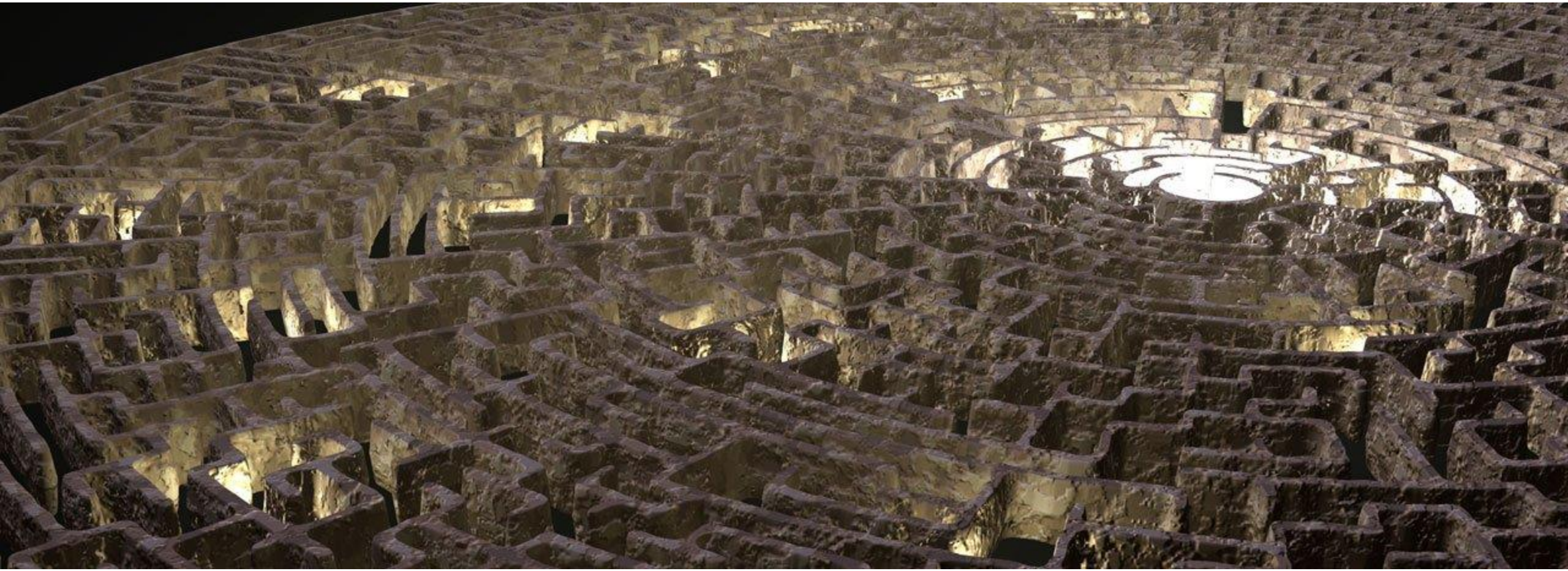
Automated Screen Printing

Wet Chemical Etching / Photolithography

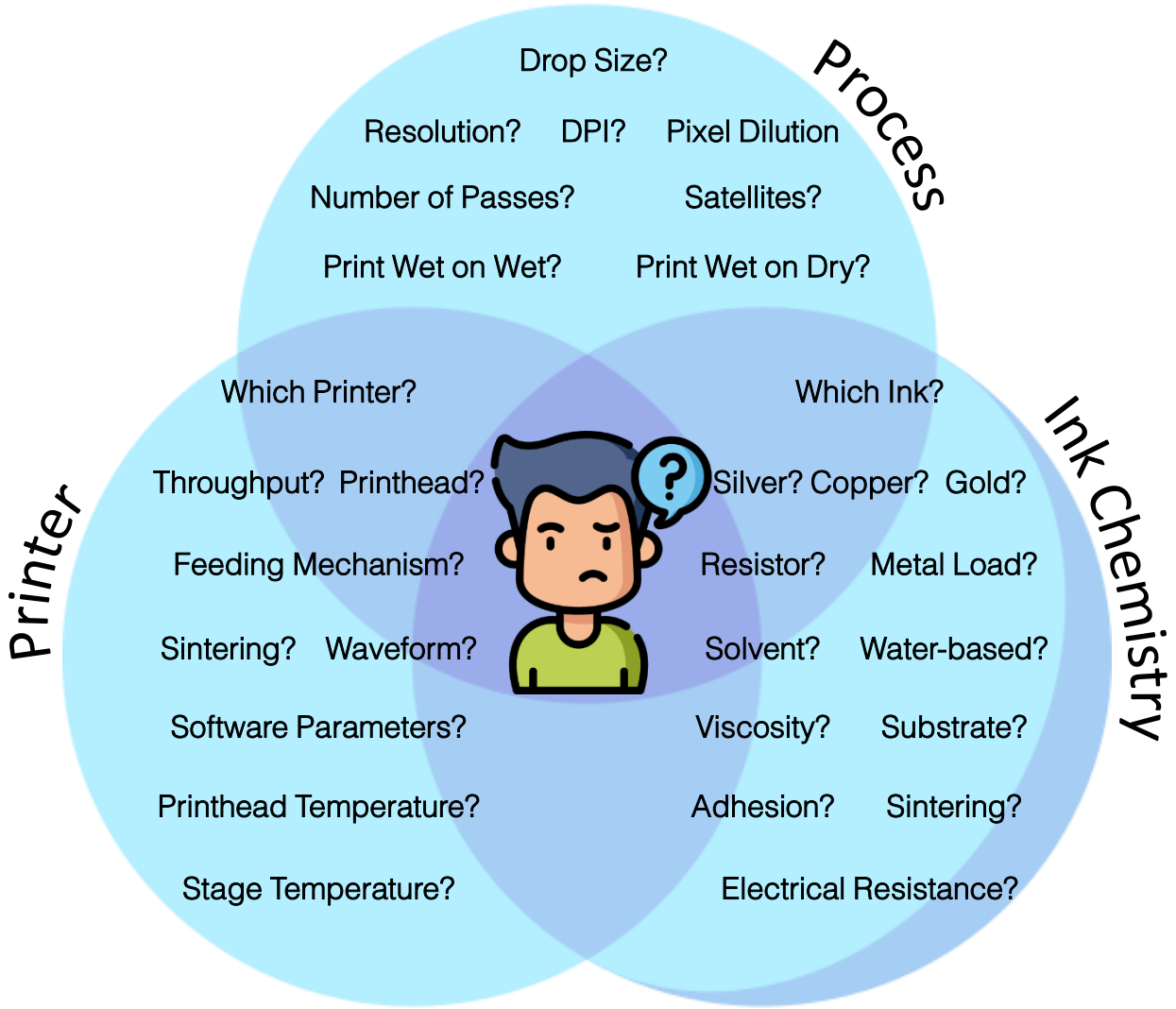


Why?

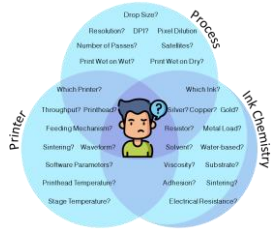
Because **Implementing** Digital Printed Electronics is **Too Complicated!**



Customer needs a PhD in Printed Electronics



PVN's Complete Solution Makes it as Easy as Driving



Driving Essentials:


Car

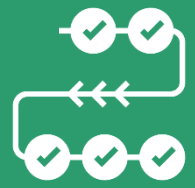

Gas

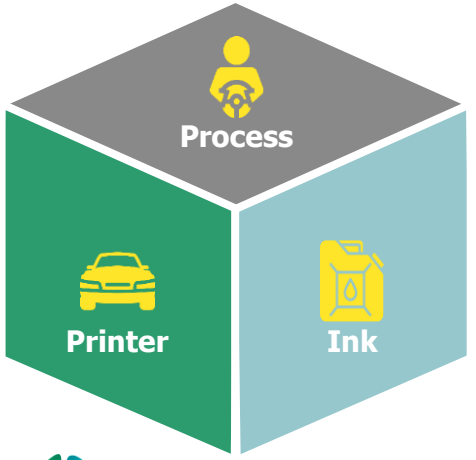

Know how to Drive

PVN's Solution:


Printer


Ink


5D Printing Process



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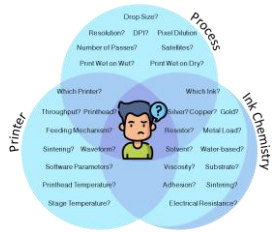
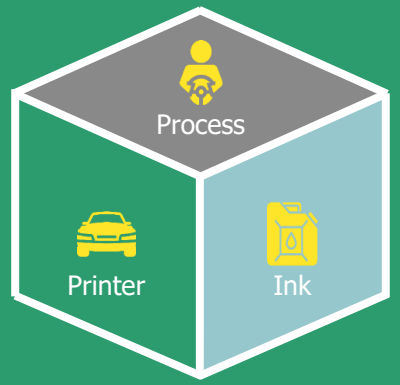
Complete Solution

How is PV Nano Cell Different?



Complete Solution
for Mass Production



Proven Solution for Mass Markets
- Automotive, Solar, etc.
- Inks, Printers & Process
- Turnkey solution.

Sicrys™ Inks
Digital, Conductive

Single Crystal Conductive Nano Inks
- Patented.
- Stable, 24/7 printing.
- High throughput.
- High conductivity.
- Green process.

Printers
by PVN & Partners

PVN DemonJet

Partner: Notion Systems

R&D, Low Volume & Mass Manufacturing
- DemonJet for R&D.
- Availability of partner's printers.
- Selection of supported printheads.

Printing Process
Development & Optimization

5D Printing Technology
- 3D Geometry
- 1D Chemistry
- 1D Process
- Optimize inks, printers & process to mass-print electrical patterns.

First Ever Complete Solution for Mass Production

Printers

Conductive Inks for Mass Production

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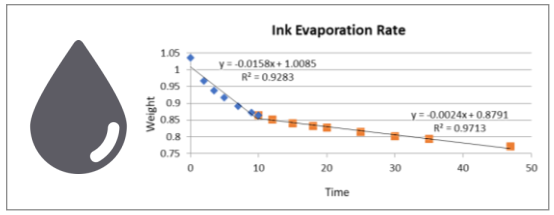
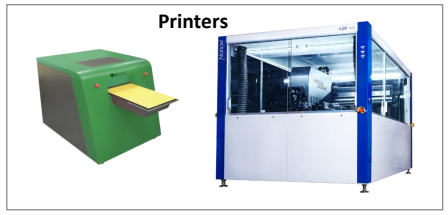
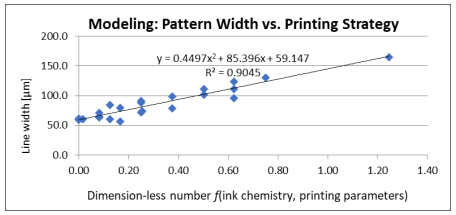
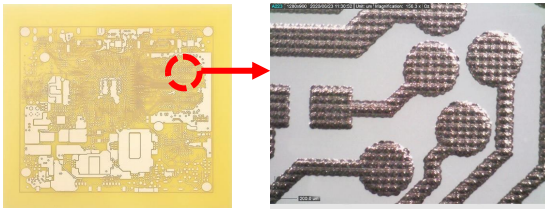
Sicrys™ Digital Inks
Single Crystal Nano Inks

5D Printing Process





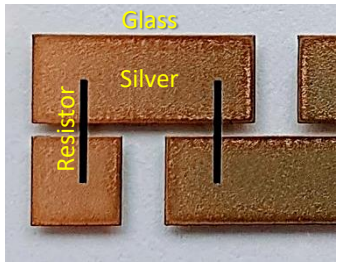




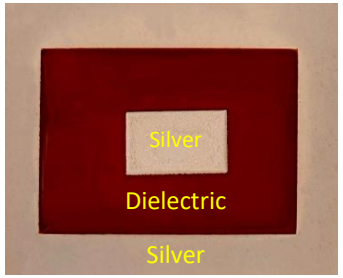
Commercial Applications & Markets Served

Automotive Windshields

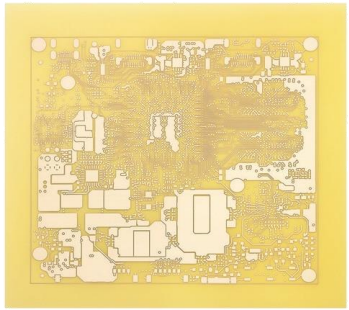
Solar Cell Fingers & Busbars



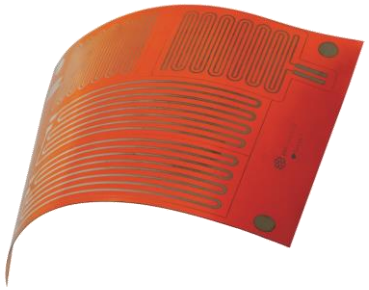
Embedded Printed Resistor



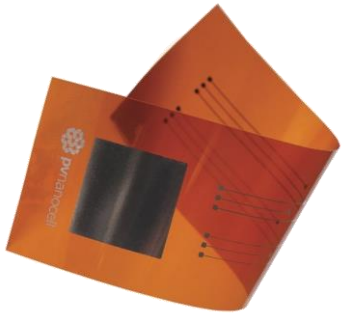
Embedded Printed Capacitor



Printed Circuit Board on FR4

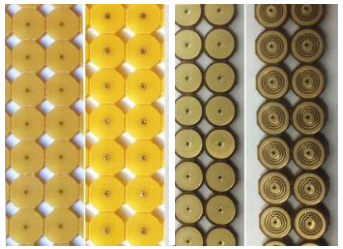


Flexible Antenna

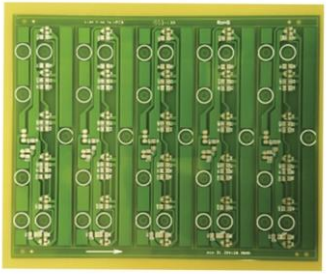


Flexible Heater

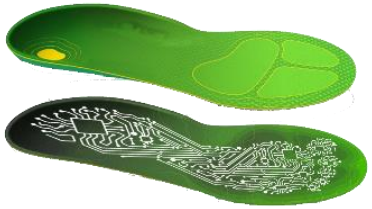
Phone Antenna



Special Heater



1-Layer PCB



Electronic Insole

Medical Sensor on Paper

4-Layer PCB

Coil with 18 Turns

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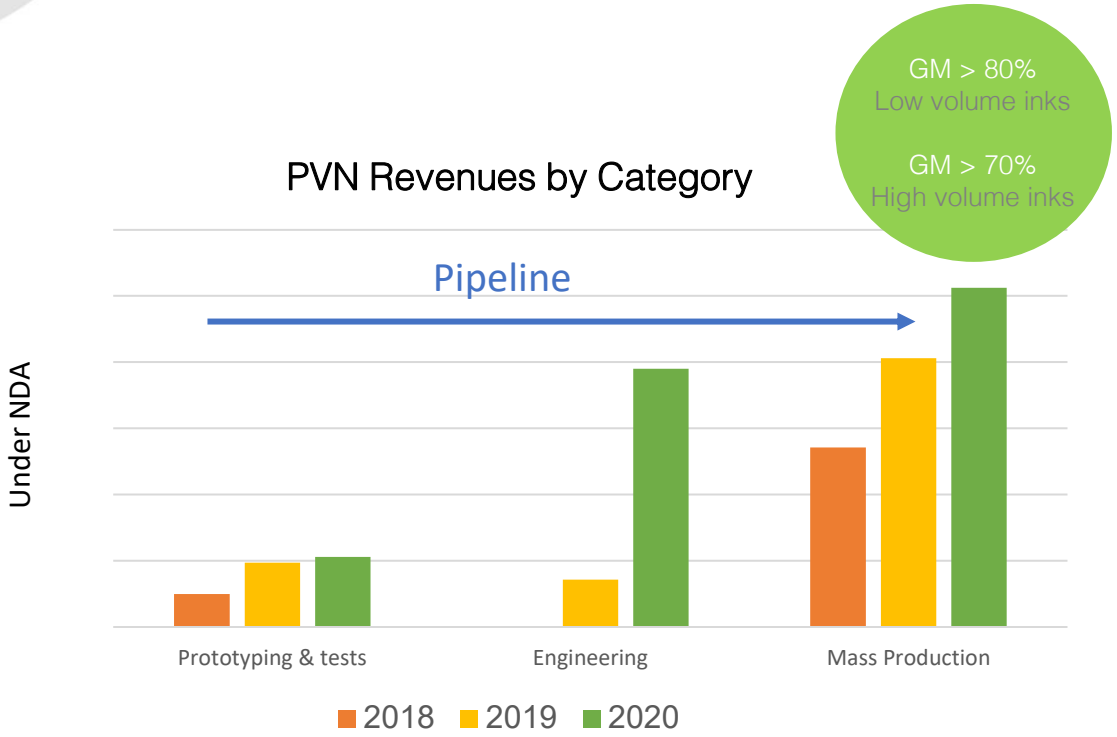
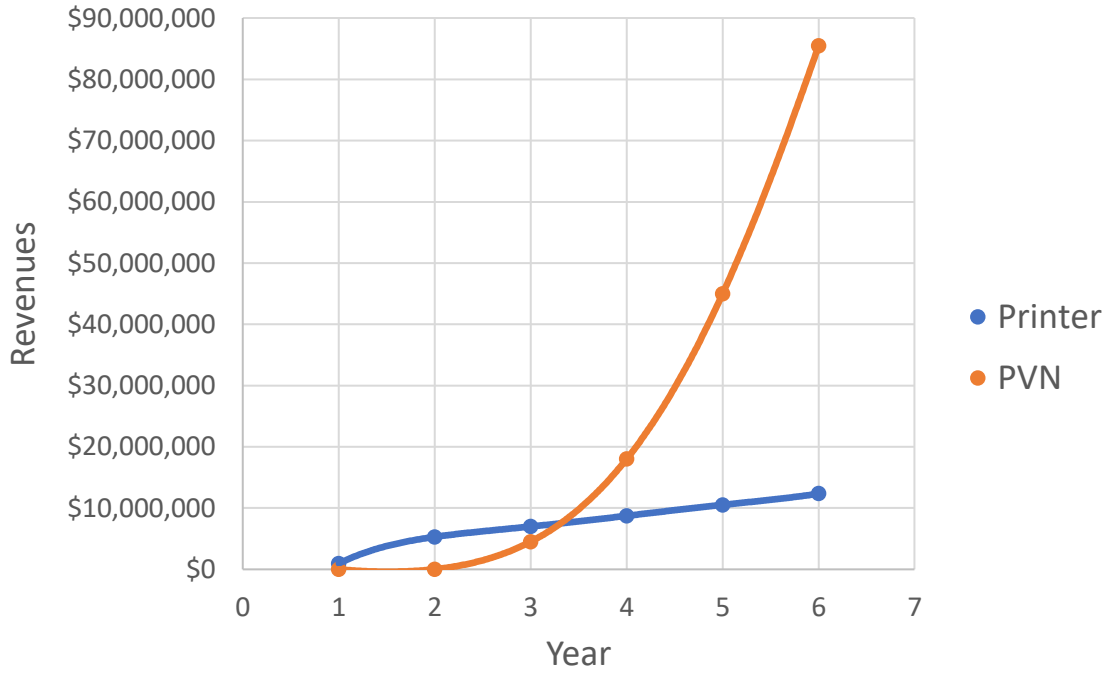
Growth Drivers: Pipeline + “SaaS Like” Business Model



- Rapidly implementing high growth margin plan to leverage growing market
- 2019: Low volume inks, GM >60%, High volume inks, GM>50%.
- PVN mass production-focused Complete Solution enables Digital PE growth by enabling:
  - New products that can’t be made with the current technologies.
  - Updated design and changes to current products, offering them new added value.

Note: Actual figures until October 25th, 2020. Linear extrapolation to end of year.
* H1/19 reviewed financials

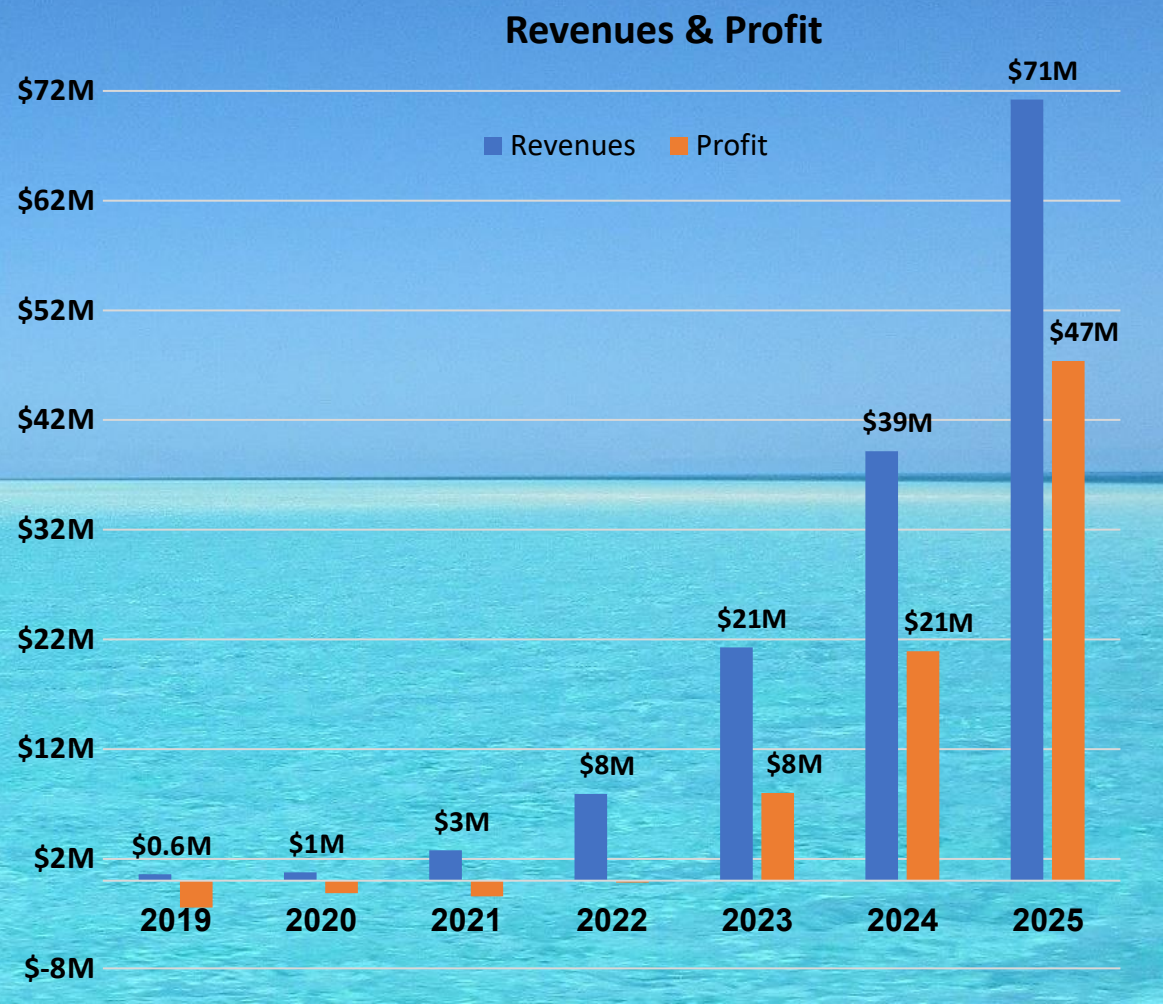
PV Nano Cell (PVN) vs. Printer producer, model benchmark,
Business Model: Inks-based vs. Printers-based Revenues



Link to Business Highlights slide

Join PVN's Unique Offering Opportunity!

	Phase I Leverage Existing Customers	**Phase 2** Sales Boost	**Phase 3** Market Leader
Use of proceeds	• Expand Sales & Application teams • Finalize Audit 2019/2020, 20F	• Expand S&M, Application teams and production capacity. • IPO Prep	• Expand S&M • M&A
Funds needed	$4M	$5M	>$30M
Offering	Existing Shareholders and fast decision makers	PIPE/OTC	Public/IPO
Valuation	$12M Pre-Money	⬆	⬆⬆

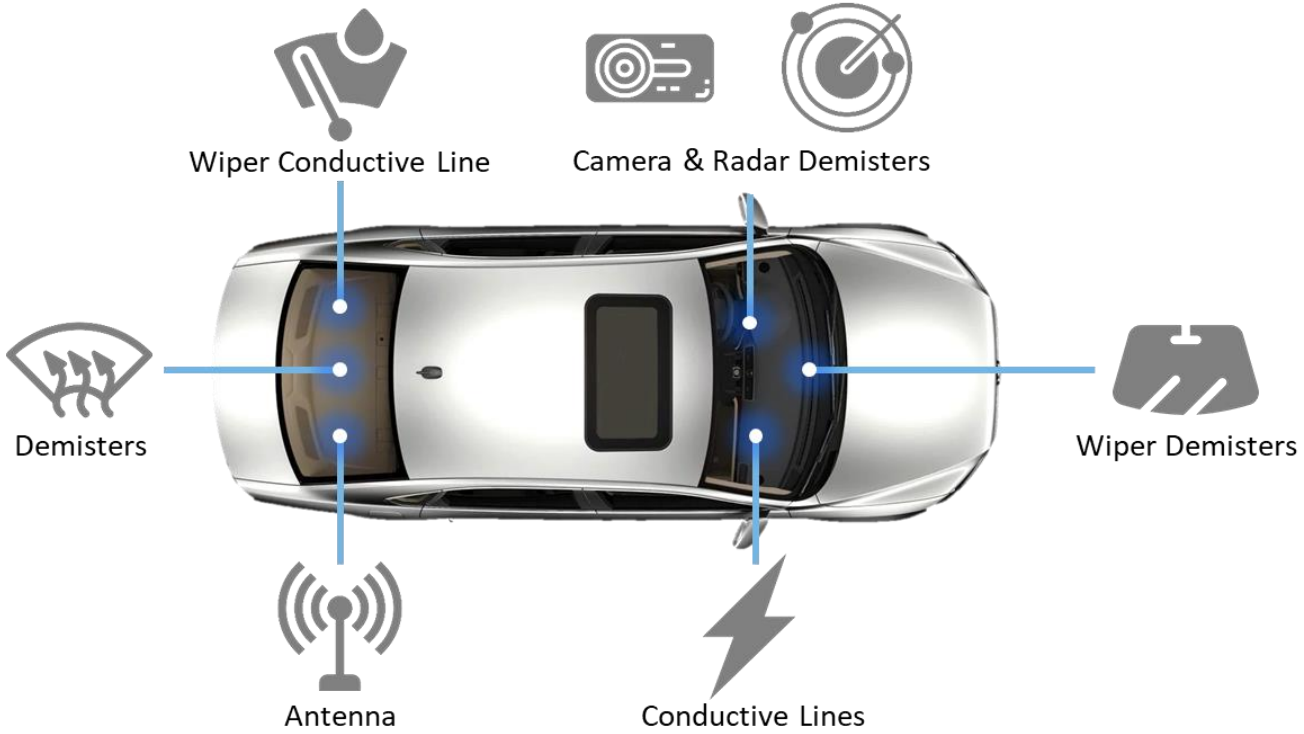


Electronics Everywhere: Automotive Market

- Windshields are filled with Electronics
  - Multi inks printed using one printer.
  - Narrow & dense electronics.
  - Large format
  - Each windshield is different.

Printed Defroster and Dense Electronics on Car Windshield

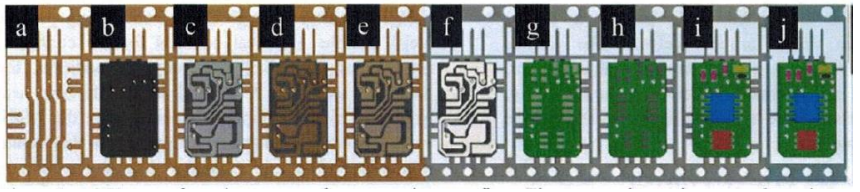
pvnanocell Inkjet Inside

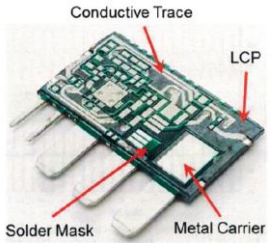


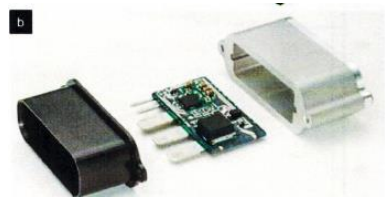
Electronics Everywhere: Automotive Market Future Technologies

- “Smart” Connectors by Molex
  - Narrow & thin patterns.
  - Low resistances at low sintering temperatures.
  - 2.5D and 3D printing.
  - Usage: light bulbs, power charging, etc.

molex ASEP Solutions pvnanocellInkjet Inside







- Project Tinker
  - Radar and LiDAR sensor package fabrication.
  - High throughput of up to 250 units/min.
  - PVN is sole provider of conductive ink for next generation of automotive electronics.
  - $12M EU funded project.

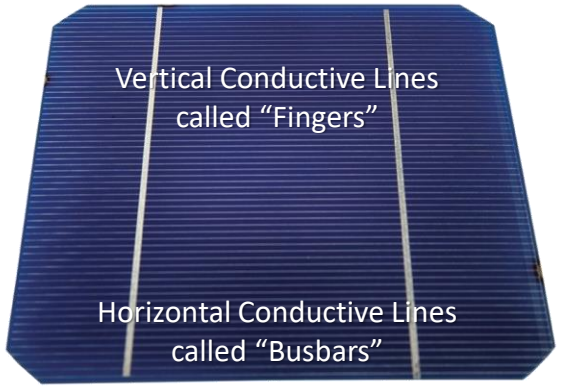
TINKER

BOSCH Automotive
Infineon Automotive
ibeo automotive
MARELLI Automotive
leti
PROFACTOR
pvnanocell
EVG
SENTECH
NOTION SYSTEMS
TIGER
INKRON
FORTH
AUSTRIAN STANDARDS
Besi
AMIRES

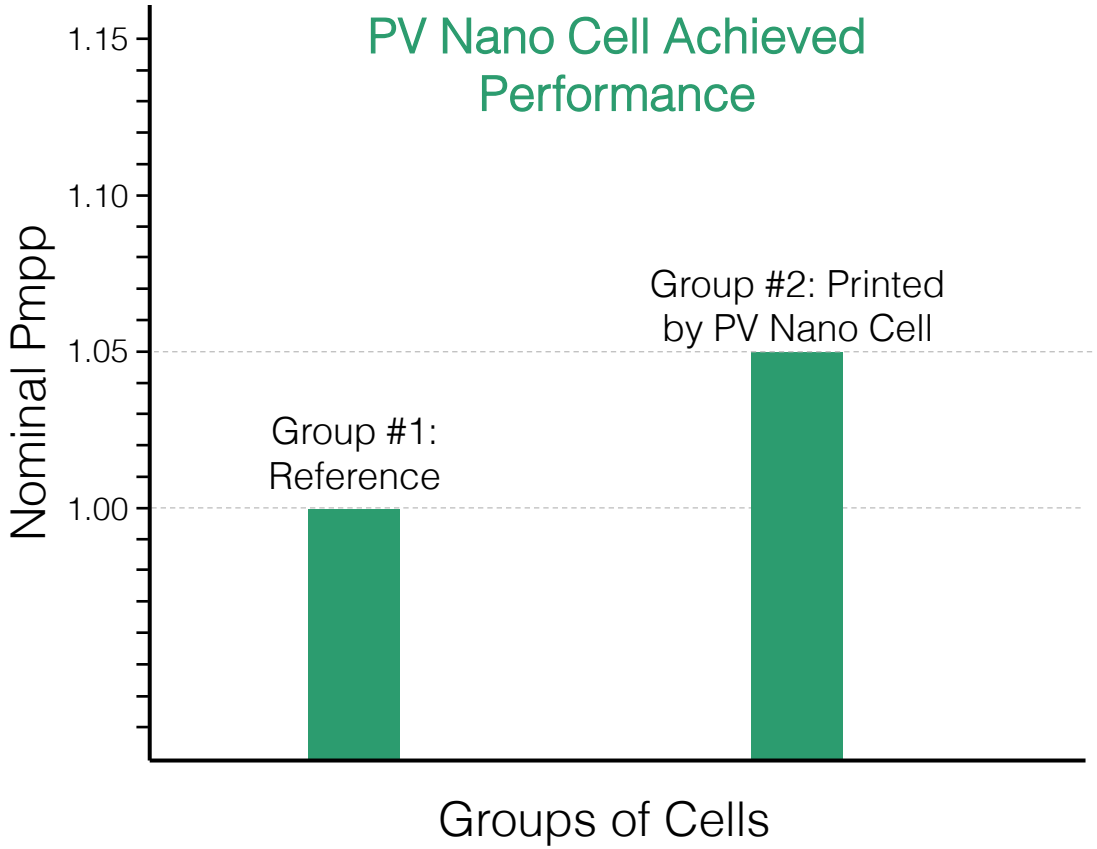
Electronics Everywhere: Solar Energy Market

- High performance Solar Cells
  - Higher performance & efficiency.
  - Narrow & thin patterns.
  - Low resistances at low sintering temperatures.
  - Large format.
  - Thinner substrates.

Printed Solar Cell



Printing fingers & busbars



Active Sales Pipeline of Mass Production Customers

Automotive: Sensors, Antennas, Defrosters, Connectors

NextGen Solar: High Power Conversion Efficiency

Printer Capacity

R&D (<10kg)

Product Qual. (10kg – 30kg)

Pilot Line (30Kg – 100Kg)

Production (100kg – 1 Ton)

molex
> $5.5B Revenues
Replaceable LED Bulbs
Micro Connectors

Customer (under NDA)
> $400M Revenues
Requires New ink

FERRO dip TECH
> $1B Revenues
Requires Ink Optimization

Channels Selling to Multiple Customers

1st Customer

+6 Products in Qualification

Customer (under NDA)

Customer (under NDA)

Fraunhofer ISE

HQ in Germany (100MW)

China: 5 Fabs x 300 MW = 1.5GW Potential

$12M

$5M

$16M

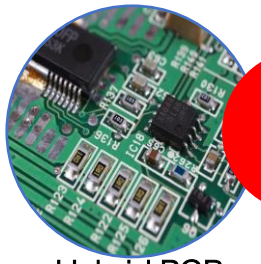
$31M

$2B, CAGR ~5.6%

$11B, CAGR ~4.3%

● Visible **annual SaaS-like** potential: **$64M**

Additional Growing Pipelines (under NDA)



$21M

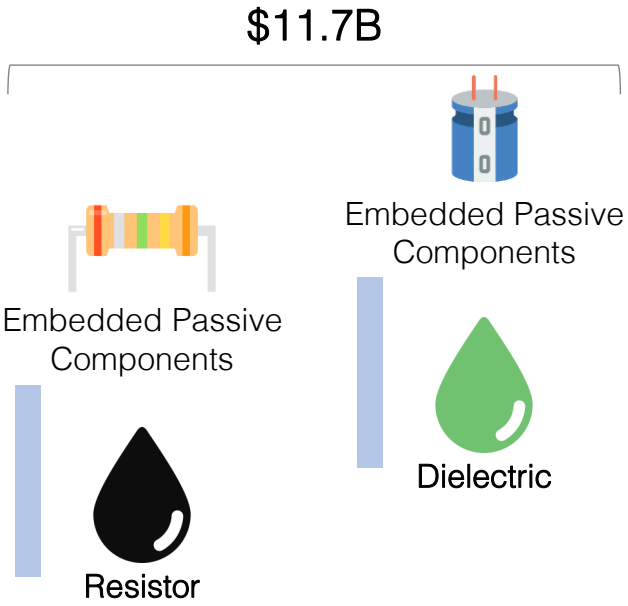
Hybrid PCB

Medical Devices

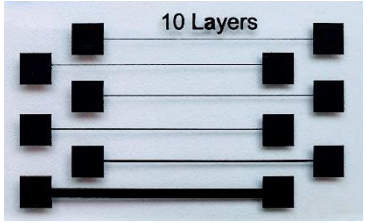
Electronics Everywhere: Embedded Passive Components Market

- Embedded Passive Components
  - Multi inks printed using one printer
  - Multi functional patterns.
  - New electronics
- Generic:
  - Customization.
  - Personalization.
  - 5D printing – 5 degrees of freedom.
- Flexibility
  - Zero set up.
  - Agnostic to batch size.
- Specific for embedded passive components:
  - New electronics.
  - Lighter and thinner electronics.
  - Denser electronics.
  - Flexible electronics easier.
  - Agnostic to substrate size.
- Lower costs.

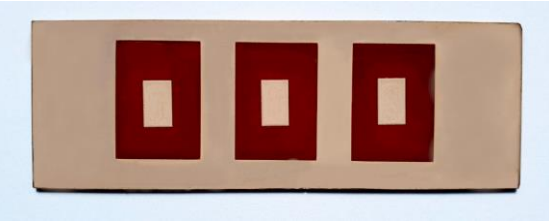
PVN DemonJet Printer & Sicrys™ inks



Embedded Passive Components



Printed Resistors

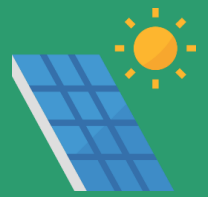


Printed Capacitors

Building a Massive Pipeline (March 2021)


Strategic


Glass & Ceramics


Solar


Embedded


Others


Medical

hp
Henkel
EPSON
SunChemical
intel

PILKINGTON
AGC
SAINT-GOBAIN
TECGLASS
COLOROBBIA BRASIL
sicer ITALIAN CERAMIC SURFACES
CERAMICOLOR
VETRICERAMICI A FERRO COMPANY
SMALTOCHIMICA CHEMICALS FOR CERAMICS
INCOLOUR

Hanergy Thin Film Power
SOLOPOWER SYSTEMS
Flisom Flexible Solar Modules
OXFORD PV The Perovskite Company
SOLAR FRONTIER
Ascent SOLAR
Siva power

FLEXTRONICS
VISHAY
orbotech A KLA Company
muRata INNOVATOR IN ELECTRONICS

GREEN PROSPERITY GROUP
cpi
ardeje
EPTANOVA
Electroloy solder connections
SYNERGIE CAD
FlexEnable Truly flexible electronics
PragmatIC
S&S
iL INNOVATION LAB thinking works
BORDEAUX DIGITAL PRINTink
sts INKS Color is in Our DNA

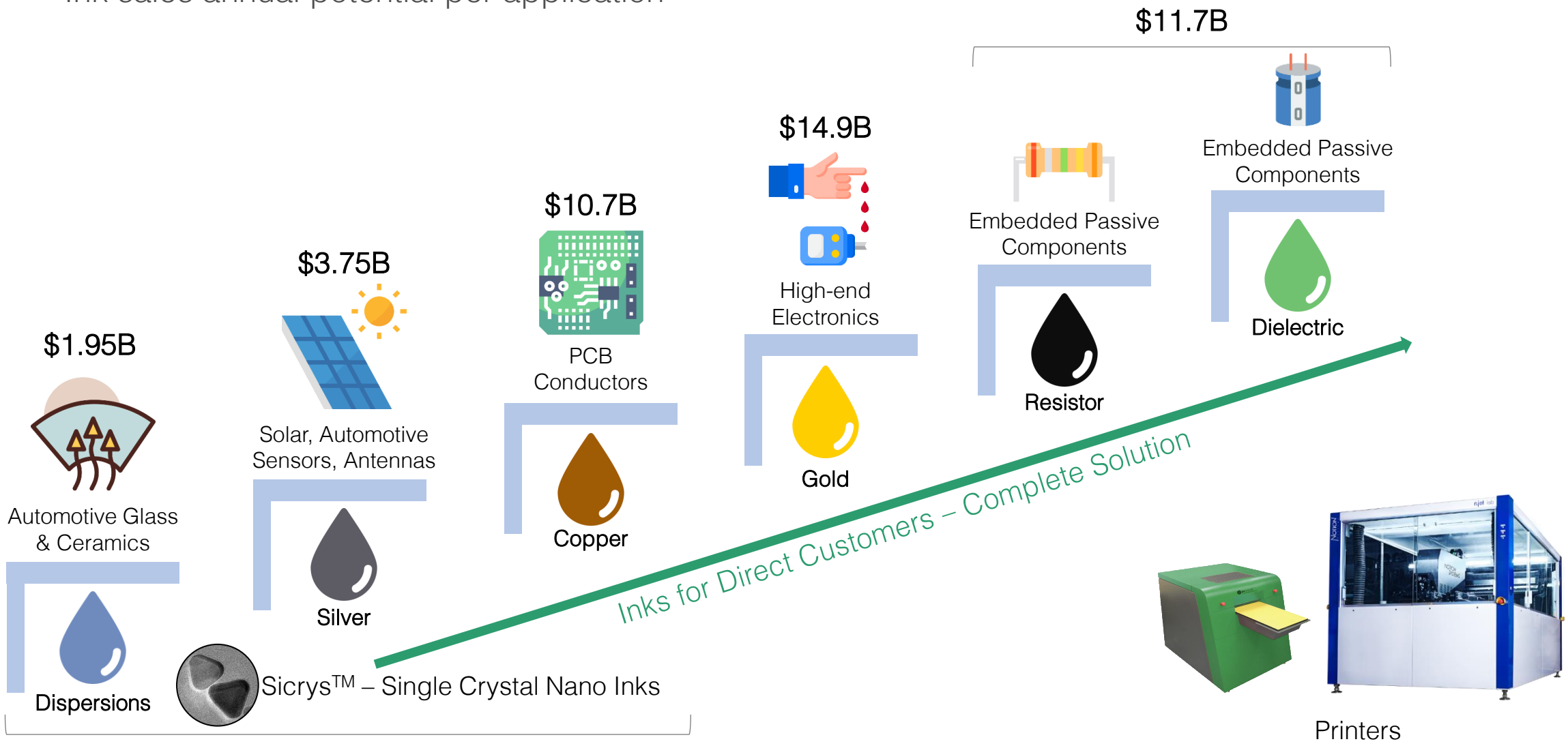
Johnson & Johnson
pilltracker

Grant Projects

Infineon
BOSCH

PVN Business Expansion enabled by Consumables

Ink sales annual potential per application



Competition & Differentiation

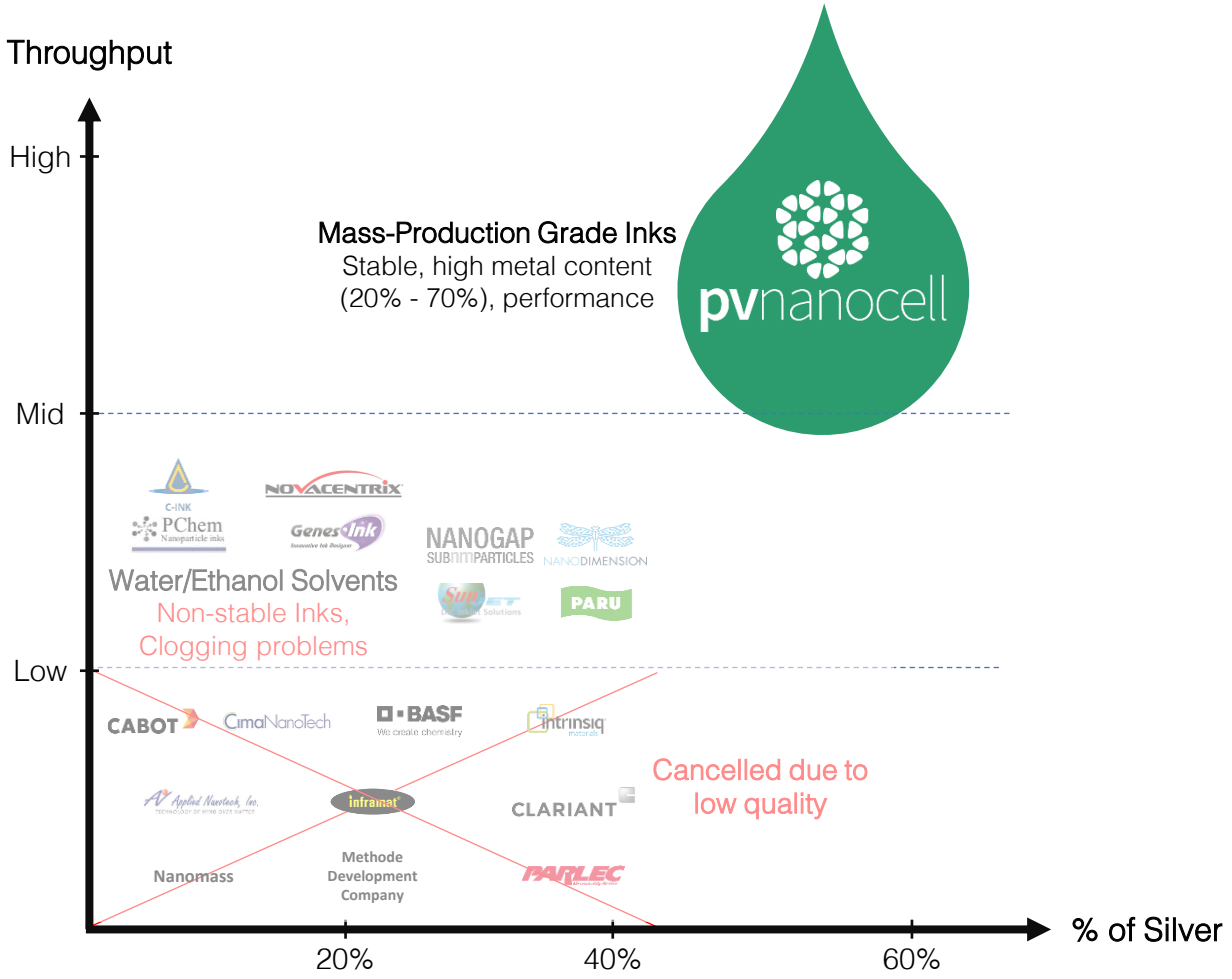
Complete Solution: Best Inks for Mass-Production + Printers + Process Optimization

Best fit for Mass-Production, today more than ever

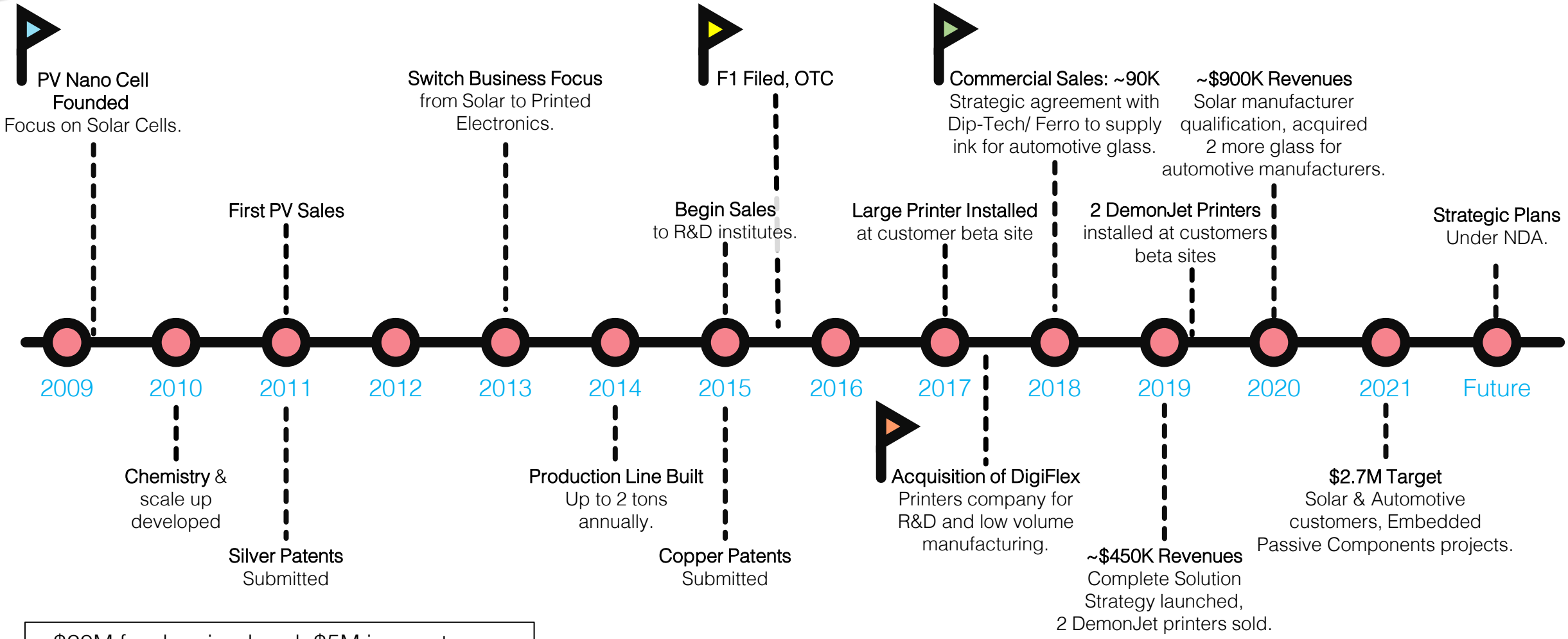
- >12 month shelf life, no nozzles clogging.
- Optimized Nano-size particles, no cracks.
- Customized chemistry per appliation / customer.
- Leveraging high-throughput digital graphic arts know-how for conductive printing.
- High metal content: 50%- 70% silver.

Partnering with customers to tailor optimized solutions per application.

DemonJet



PV Nano Cell Timeline



~$20M funds raised and $5M in grants.

Main 2020 PVN Business Highlights (in spite of COVID-19)

- Customers & Revenues
  - Revenue Growth
    - Multiple commercial Mass Production customers.
    - 80% growth in 2020 sales (in spite low resources and Corona virus constrains)..
    - 2 new PVN DemonJet printers sold & installed at 2 customers: Passive Components/Glass Switches/Flexible Electronics.
    - Gross margins increased.
  - Customers
    - Multiple High Volume & Pilot Production customers generating income.
    - Defined main focus growth areas: automotive, solar, hybrid PCB, systematic, pro-active approach.
  - Future Growth
    - Pipeline opportunities generation: materials, activities.
    - Opened an application site & building application group already working and generating revenues.
    - Process Monetization – Engineering, NRE revenues.
- Strategic Progress
    - Signed cooperation agreement with Notion Systems, Germany.
    - Cooperation discussions with EPSON (printing heads, investments, PE applications).
    - Strategic discussions with HP, Henkel, SunChemical & MicroCraft (distribution, markets).
    - Expanded product portfolio, new inks developed (resistor, dielectric, gold).

Link to Growth Drivers Slide

Intellectual Property

Sicrys™ Patents Granted:

USA	US	9,556,350 & 10,166,602
Russia	RU	2593311 & 2730285
China	CN	103282969
Japan	JP	6067573 & JP 6363138
Europe	EP	2649621 (Germany, Netherlands, UK, France)
Europe	EP	3113897 (Germany, Netherlands, UK, France, Finland, Ireland)
Israel	IL	226665
India	IN	324986
Korea	KR	10-1932781
Brazil	BR	11 2013 013885-8 A2

Copper WO PCT/1B2015/051536 (WO2015132719) National phase.

Silver WO PCT/US2011/063459 (WO2012078590) National phase.

Additional Patents:

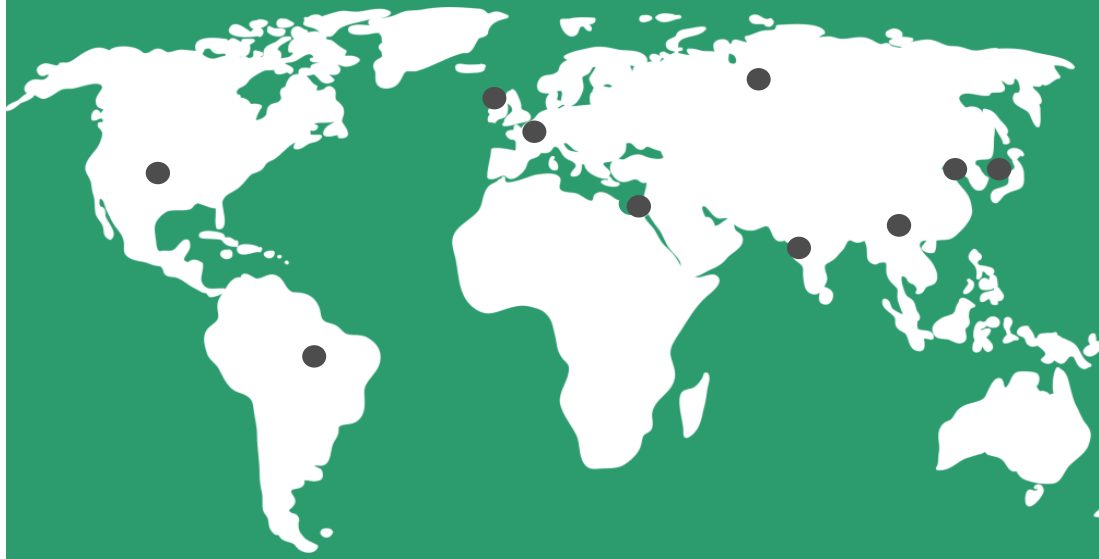
PVnanocell joint patent with TAU:

IP Nano wires for thin solar cells metallization:
WO 2013/128458
US 9,373,515 B2 Conductive Nanowires Films.

PV Nano Cell IP General
(Sono chemistry – nano materials – owned by subsidiary NZE):
USA 7,157,058; USA 7,504,075; IL 144638; IL 149932.

Main Claims: Single Crystal Nano Particles Dispersions & Inks

Strong Article Patents, Single Crystals can be Policed



DigiFlex Patents:
Process for Producing a Photomask on a Photopolymeric Surface: USA 9,513,551 and 12 countries.

Process for Dry-coating of Flexographic Surfaces: USA 9,352,544

Executive Team

Dov Farkash
Active Chairman
For the past two decades, Mr. Farkash served in a variety of business executive roles (including Vice President of Sales, Vice President - Business Development and GM of Nova's Strategic Software Business) at Nova (Nasdaq:NVMI). Mr. Farkash holds an MBA with honours and BSc in Computers Engineering, both from the Technion – Israel Institute of Technology

Hanan Markovich
Chief Business Development Officer
Extensive international experience in business development marketing and product-related executive roles. Background in companies ranging from start-ups to publicly traded global corporations engaging in multidisciplinary technologies. Holds a bachelor's degree in Mechanical Engineering from Technion – Israel Institute of Technology and an MBA from the University of Haifa, Israel.

Fernando de la Vega, PhD
CEO, Founder & Director
Over 30 years of experience in the industry with large network and great reputation. Vast experience in management and operations. Fernando Holds a PhD in applied chemistry (Casali Institute, The Hebrew University).

Evyatar Cohen
Chief Financial Officer
Evyatar has gained extensive experience as a CFO and financial consultant in many industries throughout his career (including working for 5 years in the PwC New York office). He is a licensed CPA in both the United States and Israel.

Our Mission

- Electronics everywhere & a cleaner world!
- Enable customers:
  1. To smoothly, easily, quickly & economically implement viable Additive Digital Manufacturing processes.
  2. To benefit from fast ROI & AND short cycle to add capabilities and sell New electronics.

Let's Talk

Don't miss the opportunity!

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www.pvnanocell.com

Safe Harbor

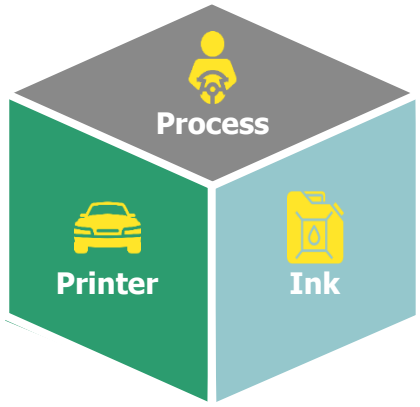
This presentation contains forward-looking statements. All statements other than statements of historical fact contained in this presentation are forward-looking statements. In some cases, you can identify forward-looking statements by words such as "believe," "continue," "estimate," "anticipate," "expect," "intend," "plan," "potential," "project," "seek," and "will," as well as the negative of these words or other comparable terminology. These forward-looking statements include, but are not limited to, statements about: the potential market opportunities for commercializing our current and planned products; our expectations regarding the potential market size for our current and planned products; estimates of our expenses, future revenue, capital requirements, and our needs for additional financing; our ability to develop and advance our current and planned products; the implementation of our business model and strategic plans for our business and products; our ability to maintain and establish collaborations or obtain additional funding; our financial performance; and developments and projections relating to our competitors and our industry. These statements reflect our current views with respect to future events or to our future financial performance and involve known and unknown risks, uncertainties, and other factors that may cause our actual results, performance, or achievements to be materially different from any future results, performance, or achievements expressed or implied by these forward-looking statements. Factors that may cause actual results to differ materially from current expectations include, among other things, those listed under "Risk Factors" in the Registration Statement on form F-1 filed with the U.S. Securities and Exchange Commission and effective as of July 5th 2019 by the Company and the 20F forms filed in May 2019. Given these uncertainties, you should not place undue reliance on these forward-looking statements. Except as required by law, we assume no obligation to update or revise these forward-looking statements for any reason, even if new information becomes available in the future.

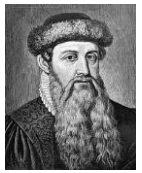
Appendix

PVN's Digital Solution: Unfair Advantage

The Need

- Enable Electronics Everywhere.
- Enable new & customized electronics.
- Short time to market.
- Clean sustainable technologies.





EPSON

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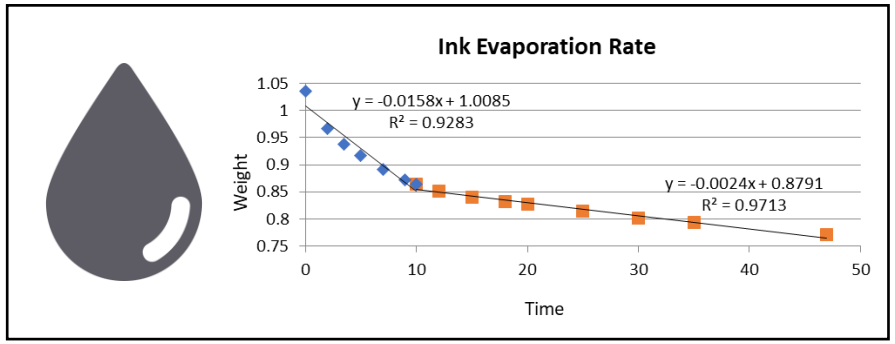
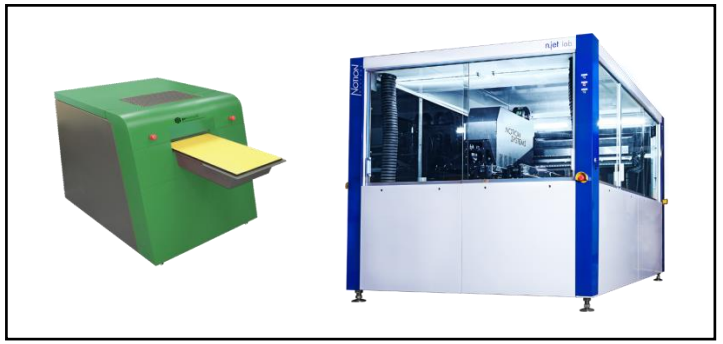
PVN's Unique Offer

- **Digital Printing Inks** – enable digital mass production processes of new and customized electronics.
- **Guarantied Electrical Performance** – PVN's 5D Digital Complete Solution optimizes ink properties & printing strategy.
- **High Reliability** – superior uniformity, errors free (e.g. alignment, placement, critical @ large areas with high resolution requirements).
- **Productivity** – Zero Setup Time (enables just-in-time printing), high throughput printing.
- **Complete Solution Offer** – enables customers smooth and fast technology implementation.
- **Fastest Time To Market** – transfer immediately from design-to-print.
- **Clean Technology** – additive technology → zero waste, no hazardous wastes

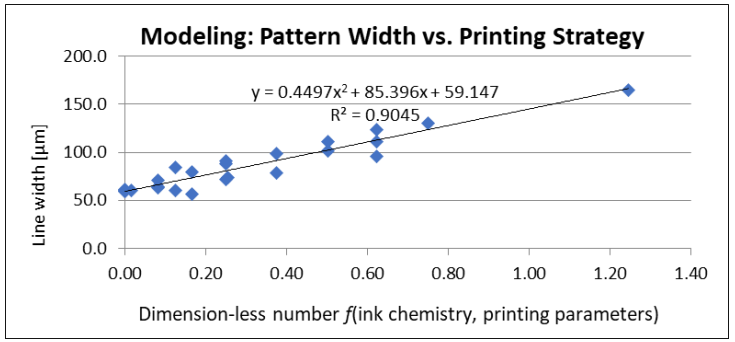
High quality, High throughput PVN's **5D Printing Technology**



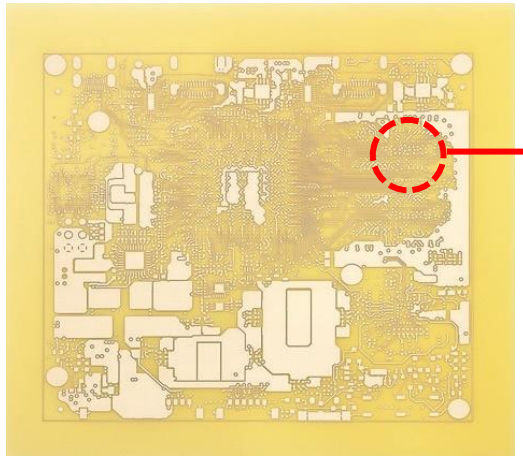
Optimized Ink
(Metal Content, Stability, Viscosity Temperature, etc.

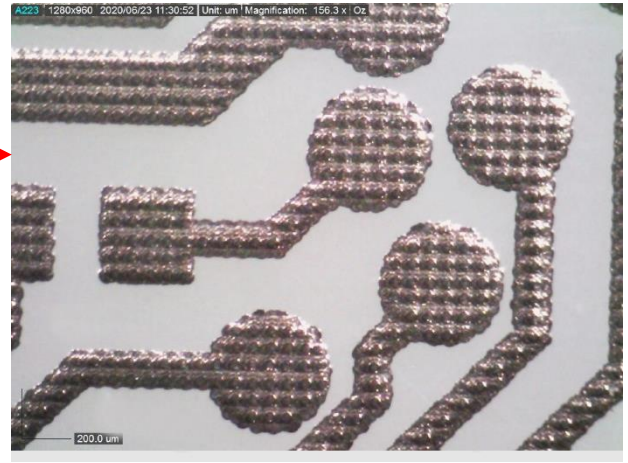


3D Printing
Low Volume Manufacturing to Mass Production



Printing Process
Translating Electrical Requirements to Optimized Inks, Printers & Sintering





Dense Pattern on FR4
70 µm width & small pitch

Securing partnerships and making acquisitions to provide Complete Solutions to market needs

<u>Generic Prototyping and R&D Solution</u>:
DemonJet printers provided by PV Nano Cell after the acquisition of DigiFlex (Printer Producer)

From Design to Prototype in Minutes

PV Nano Cell Facilities

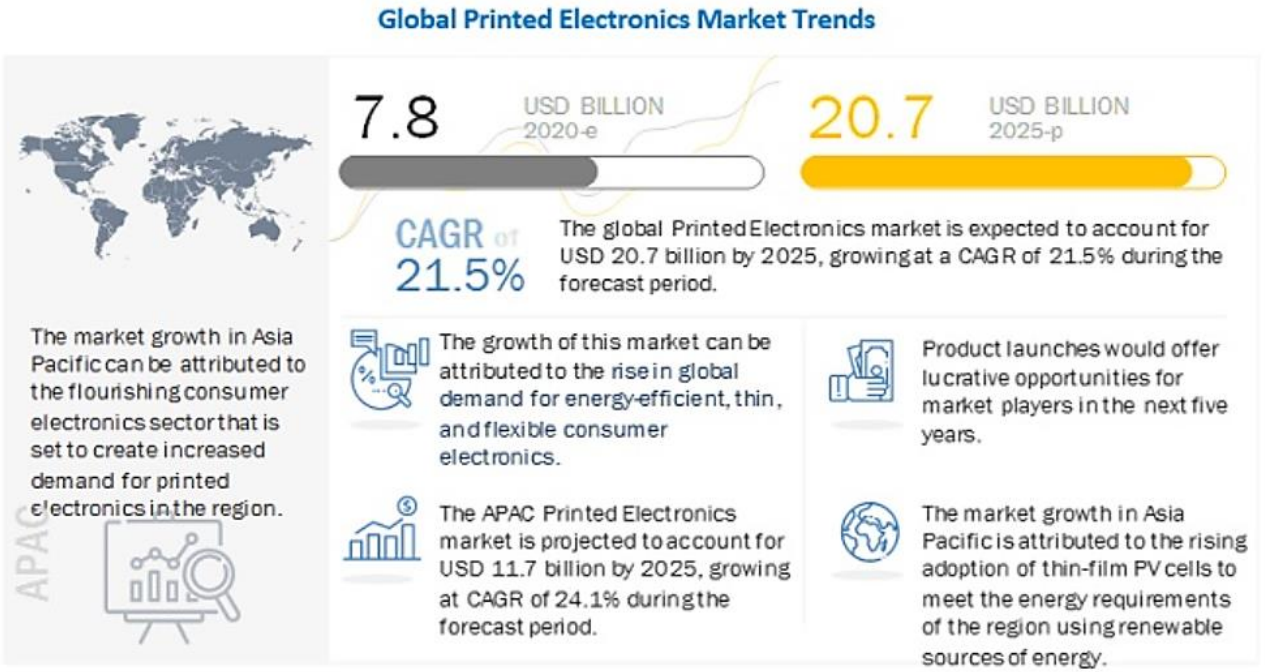
DemonJet, Epson Printing Platform

<u>Mass Production Solutions:</u>
A range of 3rd party printers by leading manufacturers to various applications:

From Prototype to Mass Production in a Day

PVN's Route to Printers Producers & Print Head Customers

Dramatic Business Growth Opportunity: Printed Electronics



https://www.marketsandmarkets.com/Market-Reports/printed-electronics-market-197.html

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Dramatic Business Growth Opportunity: Printed Electronics

- Generic:
  - Customization.
  - Personalization.
  - 5D printing – 5 degrees of freedom.
- Flexibility
  - Zero set up.
  - Agnostic to batch size.
- Specific for printed electronics:
  - Narrow patterns.
  - Better electrical properties.
  - Compatible with temperature sensitive substrates.
  - Agnostic to size.
- Lower costs.

Dramatic Business Growth Opportunity: Glass and Ceramics

- The ceramic inks market was valued at USD 1.71 Billion in 2016 (USD 1.95 in 2018) and is projected to reach USD 2.59 Billion by 2022, at a CAGR of 5.5%- 7.2% between 2017 and 2022/5.
- Ceramic ink are used in various applications namely ceramic tiles, glass printing, and food container printing.
- The ceramic inks market is moving toward the complete replacement of analog printing technology with digital printing technology. The major markets such as China, Brazil, and India are rapidly moving toward digital printing. If this scenario continues, more than 95% of the market will be occupied by digital printing technology for ceramic decoration application by 2022.

Sources

- https://www.marketsandmarkets.com/Market-Reports/ceramic-inks-market-55193405.html?gclid=Cj0KCQjw-uH6BRDQARIsAI3I-UeT8wiD60pU8DYageeas3EaNw0Cc_FC-T2N9z3KE0W0TrC9I6HdvewaAr0jEALw_wcB
- https://www.gminsights.com/industry-analysis/ceramic-ink-market?gclid=Cj0KCQjw-uH6BRDQARIsAI3I-UfTn-Y4InZ-ocP-mg57Bubpb9eAV6Y98FMbRZth5_QRLTFus_yKs7IaAsiIEALw_wcB

Digital Mass Production in Automotive Glass: Value Proposition

- Generic:
  - Customization.
  - Personalization.
  - 5D printing – 5 degrees of freedom.
- Flexibility
  - Zero set up.
  - Agnostic to batch size.
- Specific for Automotive glass
  - Better electrical properties.
  - Narrow patterns.
  - Denser electronics.
  - Multi-color: same printer different materials in parallel.
  - Customized.
- Lower costs.

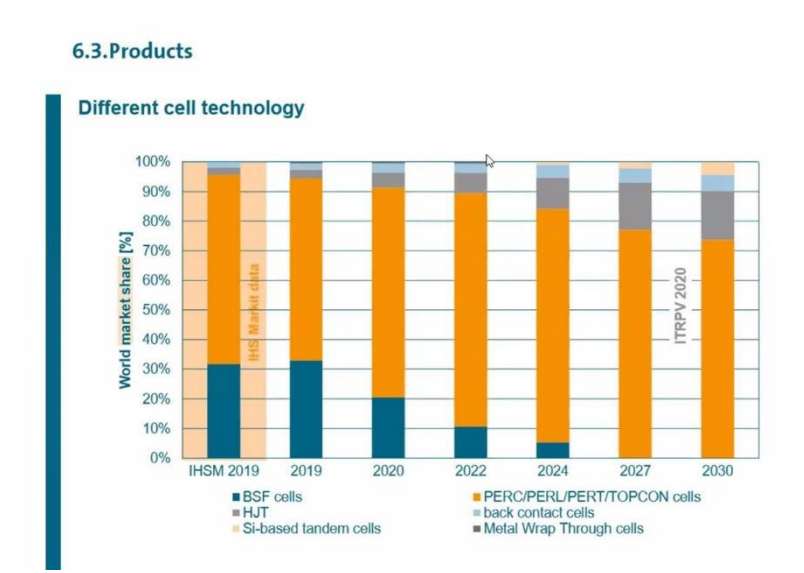
Ceramics & Automotive Glass: 10 biggest players ~ 80% of the market.

- Ferro Corporation (US, Diptech Israel), We are selling to them growing quantities.

- Zschimmer & Schwarz (Germany).
- Esmalglass – Itaca Grupo (Spain).
- Torrecid Group (Spain).
- Fritta (Spain).
- Colorobbia Holdings S.p.A. (Italy).
- Sicer S.P.A (Italy).
- Kao Chimigraf (Spain).
- Sun Chemical (US).
- Tecglass (Italy).

Dramatic Business Growth Opportunity: Solar Cells

- The solar cell market is expected to be a $76.6B market in 2020 with a CAGR of 8.1%.
- Around 10% of this market is Thin film, HTJ, CIGS technologies, which are relevant to PVN.
- The Thin film, HTJ, CIGS technologies are expected to capture ~20% of the market by 2030.



Sources:
- https://www.marketsandmarkets.com/Market-Reports/building-integrated-photovoltaic-market-428.html
- Fraunhofer ISE

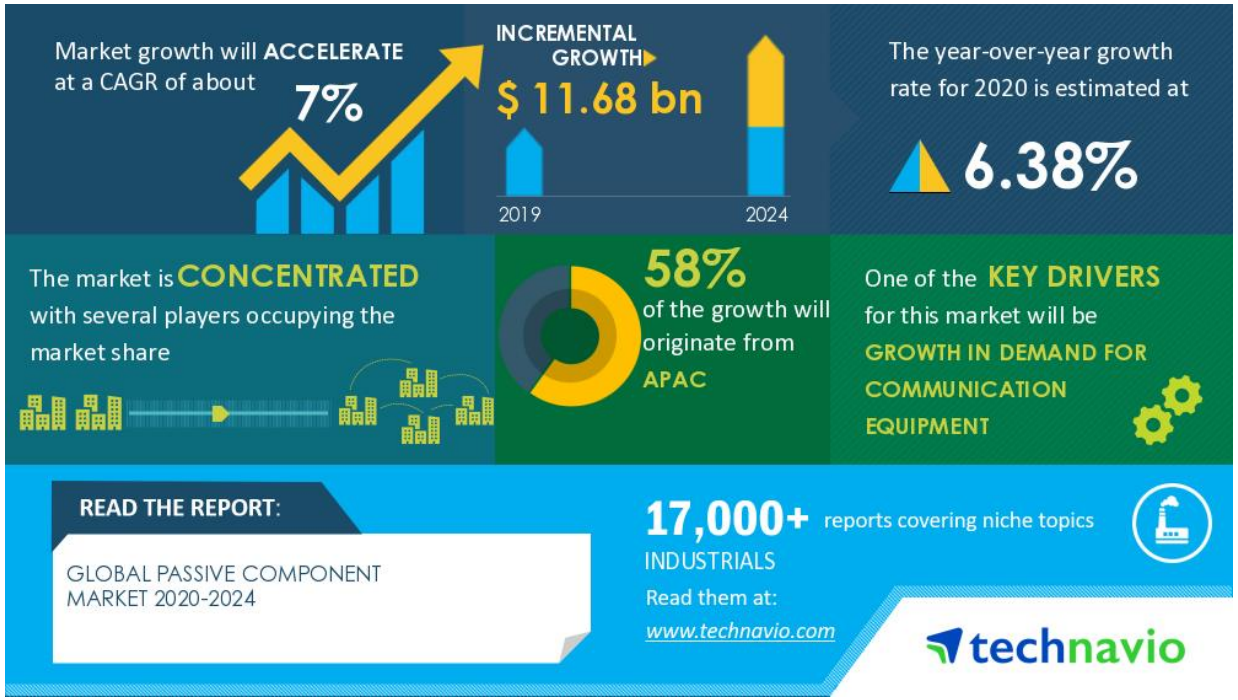
Digital Mass Production in Solar Cells: Value Proposition

- Generic:
  - Customization.
  - Personalization.
  - 5D printing – 5 degrees of freedom.
- Flexibility
  - Zero set up.
  - Agnostic to batch size.
- Specific for solar cells:
  - Higher cell efficiencies.
  - Narrow patterns.
  - Better electrical properties.
  - Compatible with temperature sensitive cells.
  - Agnostic to cell/module size.
- Lower costs.
  - No breakage in printing.
  - Decrease silicon thickness.
  - Less silver.

Dramatic Business Growth Opportunity: Embedded Passive Components

- The global passive component market is poised to grow by USD 11.68 Billion during 2020-2024, progressing at a CAGR of over 7% during the forecast period.*
- Global Printed Circuit Board (PCB) Market Expected to Reach an Estimated $89.7 Billion by 2024, with a CAGR of 4.3% from 2019 to 2024.**

Printed embedded passive components potential market for thousands of printers & inks.



* Source: technavio.com
** Source: PRNewswire

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Digital Mass Production in Passive Components: Value Proposition

- Generic:
  - Customization.
  - Personalization.
  - 5D printing – 5 degrees of freedom.
- Flexibility
  - Zero set up.
  - Agnostic to batch size.
- Specific for embedded passive components:
  - New electronics.
  - Lighter and thinner electronics.
  - Denser electronics.
  - Flexible electronics easier.
  - Agnostic to substrate size.
- Lower costs.

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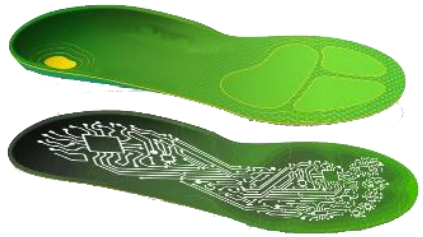
Future Additional Electronics

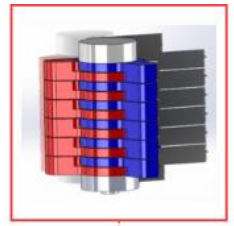
- Embedded printed Passive Components: New PCB
- Multi inks printed using <u>one</u> printer.
- Multi functional patterns.
- New electronics.
- Thinner and flexible “smart” electronics.

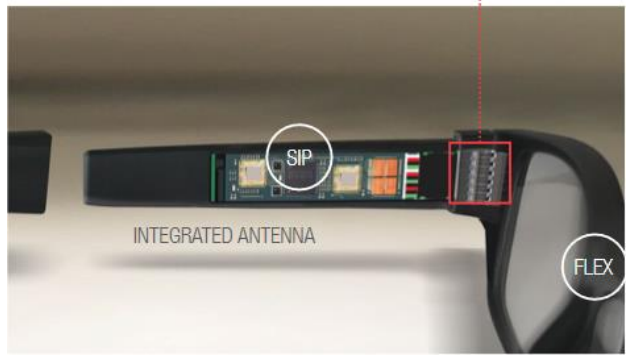
<u>Smart Insoles</u>



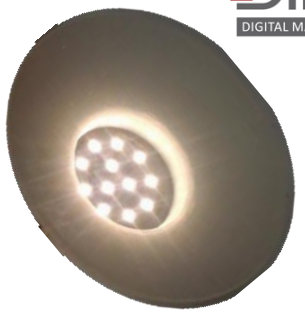
<u>Smart Connectors</u>

molex ASEP Solutions





DiMAP
DIGITAL MATERIALS FOR 3D PRINTING



3D-Printed Philips luminaire using polyjet technology and PV Nano Cell Sicrys™ conductive ink.

Prestigious Development Projects
(Funded Consortiums)

Our engineers are involved in an array of projects around the world with leading research centers, companies, universities and more to bring the technologies of the next century

Coming Soon: Bussard, Solar Cells - Fraunhofer ISE