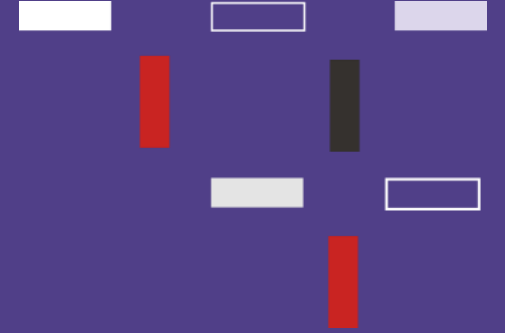
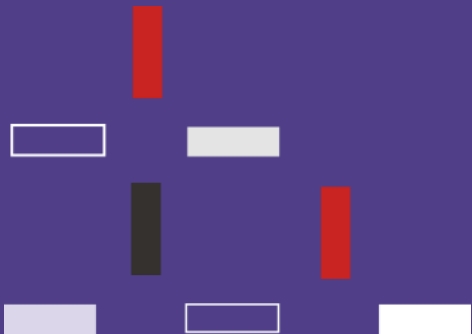


BACKING  
*VISIONARY*  
ENTREPRENEURS

European  
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Council



# OPPORTUNITIES and CHALLENGES of FUNCTIONAL PRINTING in the EU Landscape

Isabel Obieta  
Programme Manager Sustainable Electronics

Jornada Cluster Functional Printing  
6 Novembre  
2024

European  
Innovation  
Council



## Outline

- **The context.** EU and Electronics/Semiconductors
- **The “hot-spot” of Functional Printing** in this context.
- Boosting Functional Printing in Europe. **The role of the EIC**
- Conclusions

# THE CONTEXT

# CONTEXT

## EUROPEAN INNOVATION



### PERFORMANCE

- Strong research performance *not translated into innovation*
- *Lack of breakthrough / disruptive innovations* that create new markets



### FUNDING & INVESTMENT

- Financing gaps
- 2 “valleys of death”
  - In Transition from lab to enterprise
  - Scaling up for high-risk innovative start-ups



### ECOSYSTEM

- Many national & local ecosystems, but fragmented at European level
- Need to include all regions and all talent (especially female)



# CONTEXT in relation to Functional Printing

## CHIPS ACT objectives

1. Strengthen research and technological leadership – innovate in design, assembly and packaging
2. Reach 20% of chip production globally by 2030, compared with today's 7-8%
3. Create a dynamic semiconductor ecosystem in Europe and address skills shortage
4. Understand the global semiconductor supply chain

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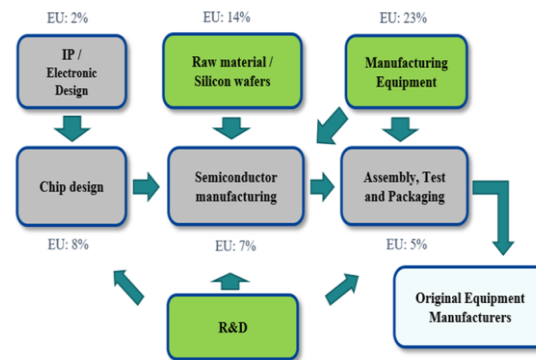
## The 4 technologies Europe wants to keep safe from China

— **Advanced Semiconductor technologies** (microelectronics, photonics, high-frequency chips, semiconductor manufacturing equipment).

— **Artificial Intelligence technologies** (high-performance computing, cloud and edge computing, data analytics, computer vision, language processing, object recognition).

— **Quantum technologies** (quantum computing, quantum cryptography, quantum communications, quantum sensing and radar).

— **Biotechnologies** (techniques of genetic modification, new genomic techniques, gene-drive, synthetic biology).



## Advanced Materials 2030 Initiative

A multi-sectoral accelerator for the design, development and uptake of safe and sustainable advanced materials towards a circular economy

## An EU critical raw materials act for the future of EU supply chains

In March 2024, the Council adopted the **European critical raw materials act**, as demand for rare earths is expected to increase exponentially in the coming years.

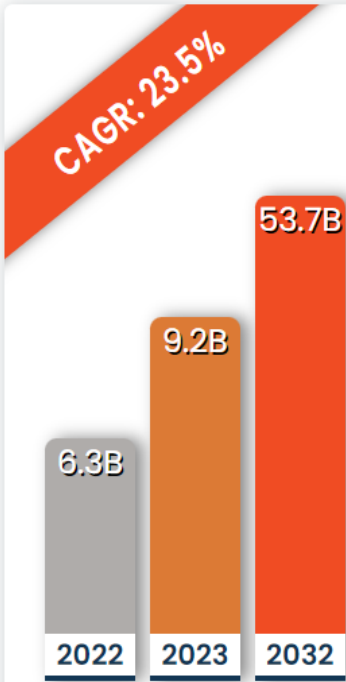
Critical raw materials (CRMs) are raw materials of **high economic importance** for the EU, with a **high risk of supply disruption** due to their concentration of sources and lack of good, affordable substitutes.

The act aims to:

- increase and **diversify** the EU's critical raw materials supply
- strengthen **circularity**, including recycling
- support **research and innovation** on resource efficiency and the development of substitutes

The new rules will also strengthen Europe's strategic autonomy.

# CONTEXT in relation to Functional Printing



Source: CMI

|                         |              |
|-------------------------|--------------|
| Study Period:           | 2024-2033    |
| Fastest Growing Market: | Asia-Pacific |
| Largest Market:         | Europe       |

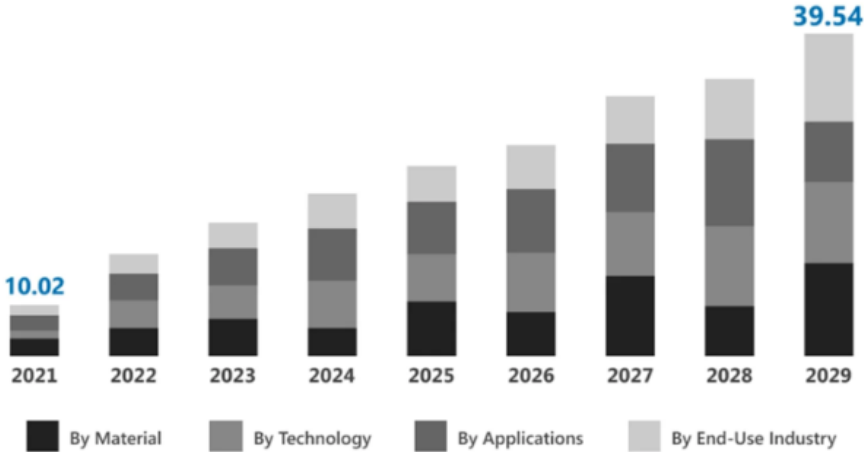
### Major Players

- E Ink Holdings Inc.
- Thin Film Electronics ASA
- Novacentrix
- SolarWindow Technologies Inc.
- Molex LLC
- Others

CAGR  
2022-2029  
**19.1%**

### Global Printed Electronics Market

Segmentation and projection till 2029 (USD Billion)



GreyViews

source: greyviews.com

### Printed Electronics Market

GLOBAL FORECAST (2024 – 2032)

#### MARKET STATISTICS

Market Value (2023)  
**\$9.2 BN**  
Market Value (2032)  
**>\$48 BN**  
CAGR (2024-2032)  
**>20%**

#### REGIONAL STATISTICS

North America  
Market Share (2023)  
**>35%**

#### SEGMENT STATISTICS

Inks segment  
Market Size (2032) **>\$21 BN**  
Healthcare segment  
CAGR (2024-2032) **>22%**

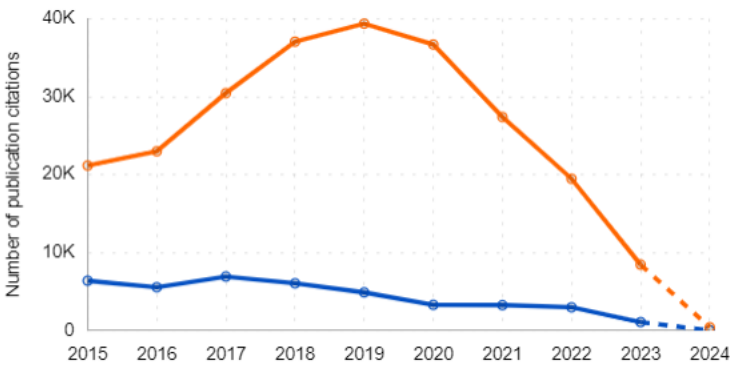
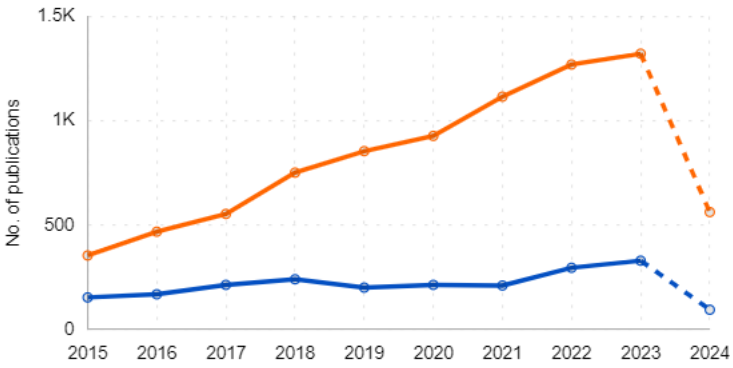


printed electronics market research

www.gminsights.com

Publication trends

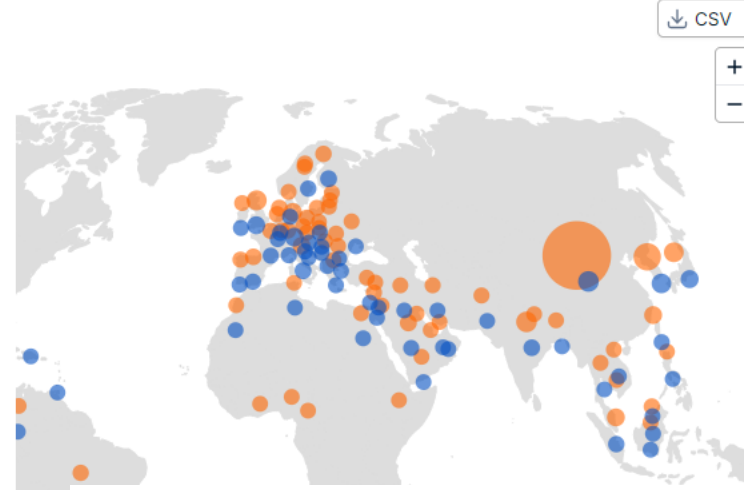
2015-2024



Printed Electronics  
Flexible Electronics

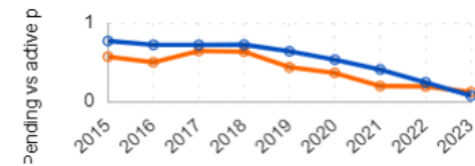
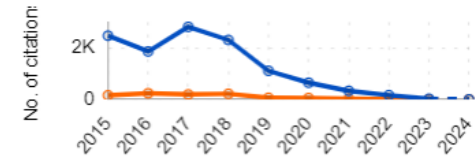
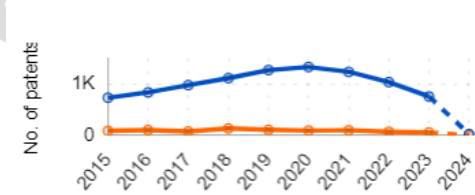
Number of publications

2015-2024



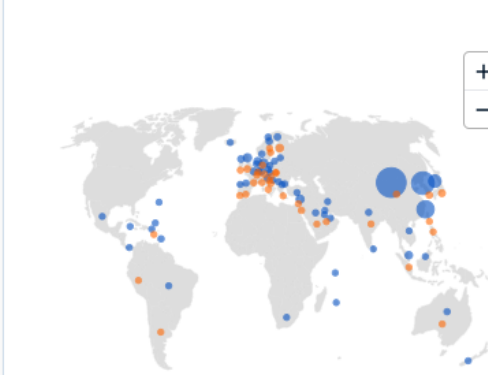
Patent trends

2015-2024



Number of patents

2015-2024



Top patent applicants

2015-2024

| Patent applicant            | Patents in EU | Patents elsewhere | Patents in US |
|-----------------------------|---------------|-------------------|---------------|
| BOE TECHNOLOGY GROUP CO LTD | 58            | 151               | 349           |
| SAMSUNG DISPLAY CO LTD      | 45            | 95                | 359           |
| INNOLUX CORP                | 11            | 6                 | 473           |
| SAMSUNG ELECTRONICS CO LTD  | 1             | 138               | 177           |
| BIOSENSE WEBSTER ISRAEL LTD | 74            | 27                | 95            |
| CHENGDU ROF                 |               |                   |               |

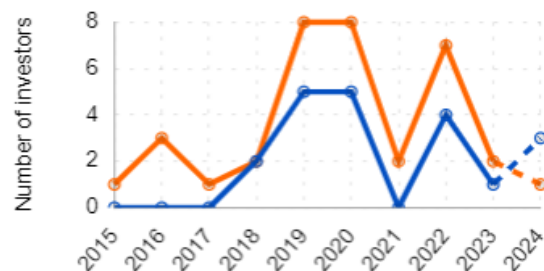
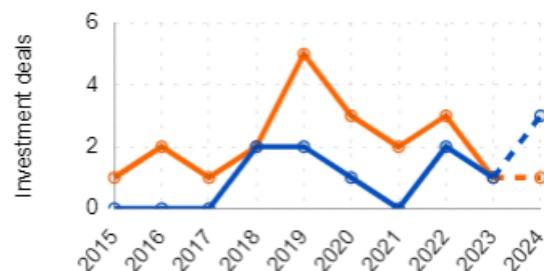


## Investment trends

2015-2024

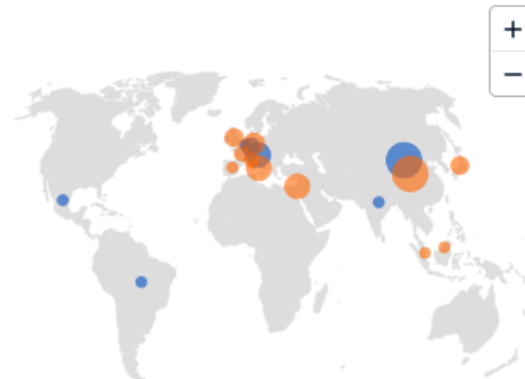
Yearly

Quarterly



## Number of investors

2015-2024



## Top investors by AUM

2015-2024

| Investor                             | Investor country | AUM     | Related Deals |
|--------------------------------------|------------------|---------|---------------|
| Addor Capital                        | CN               | 16.48B  | 1             |
| Legend Capital                       | CN               | 10B     | 1             |
| Guangdong Technology Financial Group | CN               | 6.94B   | 1             |
| Guangdong Technology Financial Group | CN               | 6.94B   | 1             |
| Wuxi New District Investment Group   | CN               | 555.04M | 1             |
| Mundi                                |                  |         |               |

# **The Hot spot of Functional Printing**

# What problem are we trying to solve with Functional Printing?

- Replacing Printed Circuit Boards? Semiconductor devices? Advanced Packaging?
- New applications: Flexible electronics?
- Sustainability??

Open Access Review

## A Comprehensive Review on Printed Electronics: A Technology towards a Sustainable Future

by Sridhar Chandrasekaran <sup>1,\*</sup> , Arunkumar Jayakumar <sup>2,\*</sup>  and Rajkumar Velu <sup>3</sup> 

<sup>1</sup> Center for System Design, Department of Electronics and Communication Engineering, Chennai Institute of Technology, Kundrathur, Chennai 600069, India

<sup>2</sup> Green Vehicle Technology Research Centre, Department of Automobile Engineering, SRM-Institute of Technology, Kattankulathur 603203, India

<sup>3</sup> Additive Manufacturing Research Laboratory (AMRL), Indian Institute of Technology Jammu, Jammu & Kashmir, India

\* Authors to whom correspondence should be addressed.

*Nanomaterials* **2022**, *12*(23), 4251; <https://doi.org/10.3390/nano12234251>

FEATURES

## Sustainability and Flexible and Printed Electronics

*As the industry makes inroads, the questions of sustainability and flexibility are drawing attention.*



# Do Startups Have a Place in the Semiconductor Supply

## Chain? (eetimes.eu)

### Where?

#### Sensors and Metrology

#### New Materials and processes:

- Materials handling, packaging and assembly
- Disrupt manufacturing

#### Sustainability:

- Innovations to replace solvents, acids,.. Manufacturing process
- Energy

Still, the innovations that drive transistor scaling are the domain of major industry players who can justify the massive R&D investments needed to develop the next process step. For example, Dutch company ASML, which specializes in the production of advanced lithography systems, invested a total of €3.1 billion in R&D in 2020. That figure represented approximately 14% of the company's net sales for the year—clearly not an appropriate place for startups to play.

I believe this perception is what keeps investors cautious when they hear “semiconductor” (or even “hardware” or “deep tech”) in a startup pitch. Nevertheless, there are several subdomains in the semiconductor industry where startups can still thrive, play a pivotal role and provide outsized returns.

**Generative AI.** The bar is lowest for this one, as investors are already predisposed to appreciate the category. In the semiconductor space, AI tools have the potential to design more efficient chips as well as chips that are purpose-built for specific functions. AI can also assist in placing and routing transistors and interconnects to optimize for size, cost and power. Finally, AI tools have a role to play in fault prediction, isolation and diagnosis, which should improve yields and lower costs.

**Test and measurement.** New categories of semiconductors will increasingly combine devices and components in ways that have never been tried before. An IoT device may have analog sensors, digital processors, RF transmitters, thin-film batteries and a mix of passives. Optical interconnects are being incorporated into new products, along with components based on new materials like silicon carbide or gallium arsenide. To reach commercial scale, new methods of collecting and analyzing test and yield data will need to be developed.

**New materials and processes.** Some of the materials and processes used in semiconductor manufacturing have remained relatively unchanged for more than 50 years. But today's increasingly complex chip designs—which may incorporate 3D stacking of thinned semiconductors, components that are vanishingly small, heterogeneous integration, chiplets and fragile materials like SiC—create difficulties in material handling, packaging and assembly. Combined with rising demand for manufacturing precision and cleanliness, these complexities bring opportunities for innovative materials and processes to disrupt manufacturing.

**Sustainability.** The semiconductor industry uses many chemicals and materials that are hazardous to the environment and generate tons of non-recyclable waste annually. The industry is also a major consumer of electricity, accounting for an estimated 1% to 2% of global electricity consumption. Innovations that replace existing solvents, acids and non-recyclable by-products of the manufacturing process with more environmentally friendly equivalents will be in demand by the industry, particularly given society's growing sensitivity around sustainability and environmental, social and governance initiatives. New factory growth will create opportunities for startups to innovate ways to reduce the energy used directly in the manufacturing of semiconductor chips, as well as the energy used in the production of the equipment and materials used in the manufacturing process.

For startups ready to innovate and participate in this exciting growth market, raising funds will continue to be difficult. Early investors must understand that deep tech means patient money, with longer times to return.

If you're a startup in this space, you will need to attract the interest of major industry players, as there is only a limited number of buyers. Take confidence in the fact that any traction in the supply chain is a sign that you have something of value. Furthermore, once your innovation is vetted and supported by the industry leaders, the barriers to entry for competitors become significant.

# **How can we boost Functional Printing**

## **The role of the EIC**



## Innovation Map outlines the Top 10 Electronics Industry Trends & 20 Promising Startups

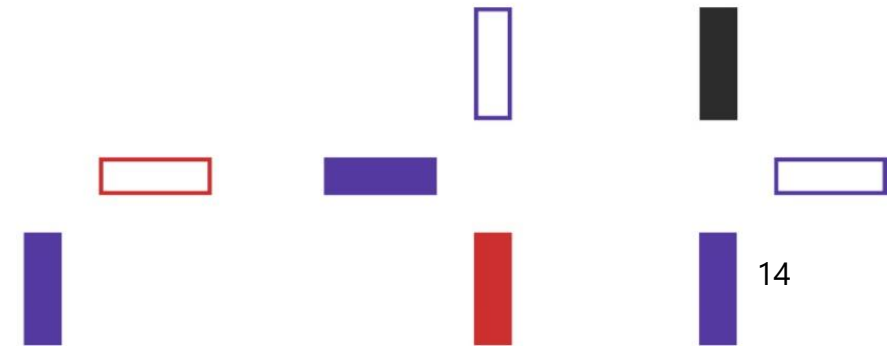
For this in-depth research on the Top Electronics Manufacturing Trends & Startups, we analyzed a sample of 1112 global startups & scaleups. This data-driven research provides innovation intelligence that helps you improve strategic decision-making by giving you an overview of emerging technologies in the electronics manufacturing industry. In the Electronics Manufacturing Innovation Map, you get a comprehensive overview of the innovation trends & startups that impact your company.

### 10 Emerging Electronics Industry Trends in 2025

1. [Advanced Electronic Materials](#)
2. [Organic Electronics](#)
3. [Artificial Intelligence](#)
4. [Internet of Things](#)
5. [Embedded Systems](#)
6. [Printed Electronics](#)
7. [Advanced IC Packaging](#)
8. [Miniaturized Electronics](#)
9. [3D Printing](#)
10. [Immersive Technologies](#)

Startups Insights 2024

Where's is the real killer application? Health?





- **Market-fit**
- Pilot fabrication facilities
- Materials supplies and cost of materials
- Skill force
- Standards
- **Ecosystem creation**

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Lab to Fab | Published: 16 September 2024

### The scale-up of printed electronics is more than just technical challenges

[Giorgio Dell'Erba](#)

[Nature Reviews Electrical Engineering](#) **1**, 634–636 (2024) | [Cite this article](#)

**771** Accesses | **1** Altmetric | [Metrics](#)

In the endeavour to bring printed electronics to market, the greatest probability of failure occurs during the scale-up stages. Technical challenges notwithstanding, it is non-technical aspects that often prevent its commercial success.

# *The European Innovation Council*

## HORIZON EUROPE

### European Innovation Council

Support to innovations with breakthrough and market creating potential.

- Focus on high risk, disruptive startups & SMEs with scale up potential
- EIC Fund set to become largest early stage VC investor in Europe, crowding in other investors.
- Flexible follow up funding (“Transition”) to create business opportunities out of research results.

€10.1  
BILLION

## EIC PRIZES

- Women innovators
- Capital of innovation
- Innovation procurement
- Social innovation
- Horizon
- Humanitarian Innovation



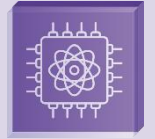
## SEAL OF EXCELLENCE

Fast track to other funding



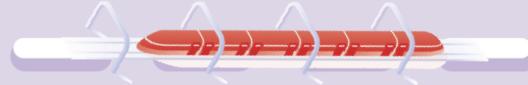
## EIC ACCELERATOR SERVICES

- Mentors, coaches
- Global partners
- Innovation ecosystems
- EIC Community Platform



## EIC ACCELERATOR

- For single companies
- Grants up to **€2.5 million**
- Equity up to **€15 million** or above
- To enter the market & scale-up (TRL 6-9)



## EIC TRANSITION

- For consortia & single companies
- Grants up to **€2.5 million** To develop
- business cases (TRL 4-6)



## EIC PROGRAMME MANAGERS

- In-house Leading Experts
- Identifying potential challenges in **emerging deep tech areas**
- Pro-actively managing EIC Pathfinder, Transition and Accelerator portfolios



## EIC PATHFINDER

- For consortia
- Grants up to **€4 million**
- To research technology breakthroughs (TRL 1-4)



# "RESPONSIBLE ELECTRONICS" PATHFINDER PORTFOLIO

European  
Innovation  
Council



Interactions on  
Computer Modelling



Optoelectronics and  
Displays



Computing and  
Memories



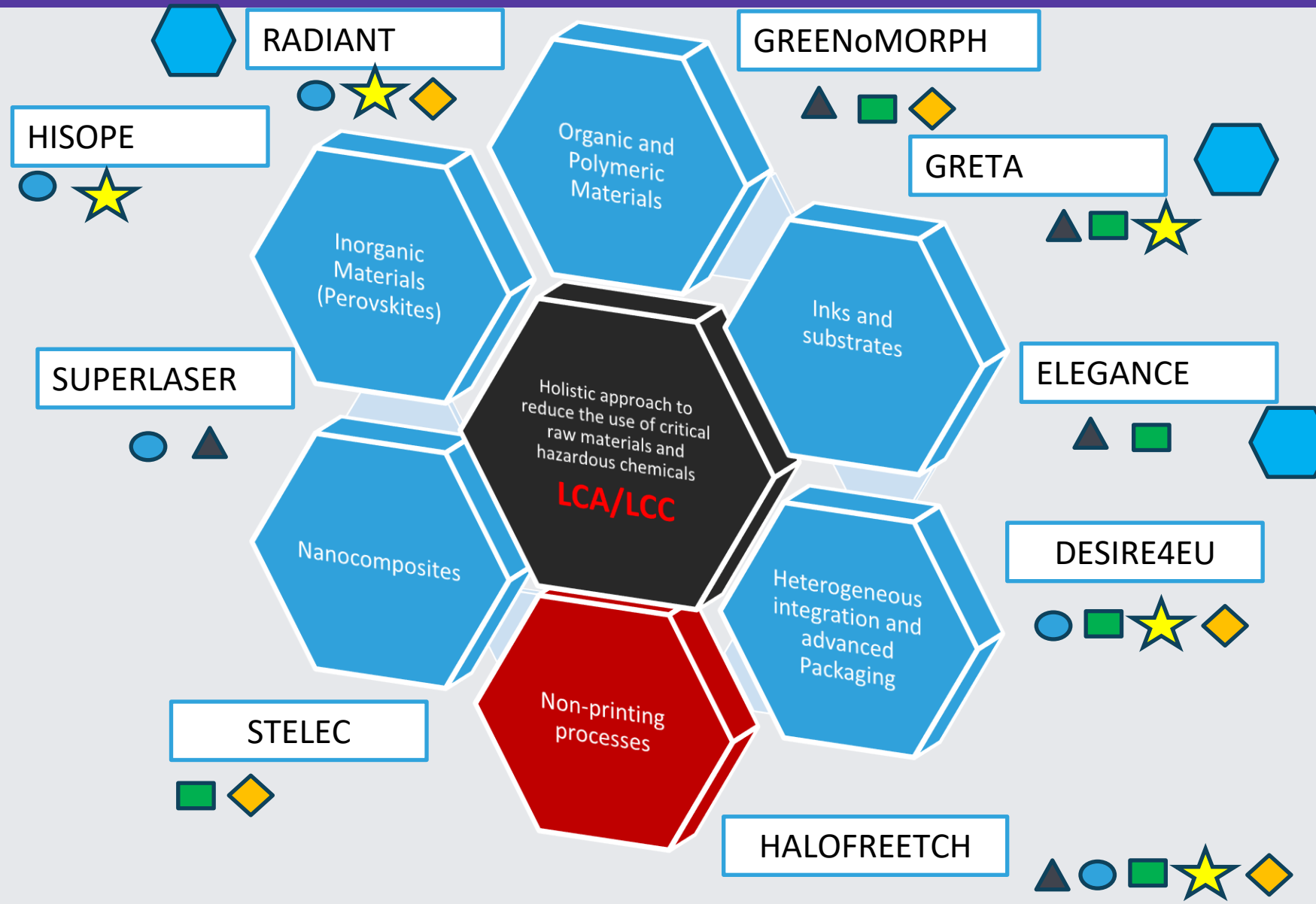
Communications



Sensors and  
Actuators



Printing processes





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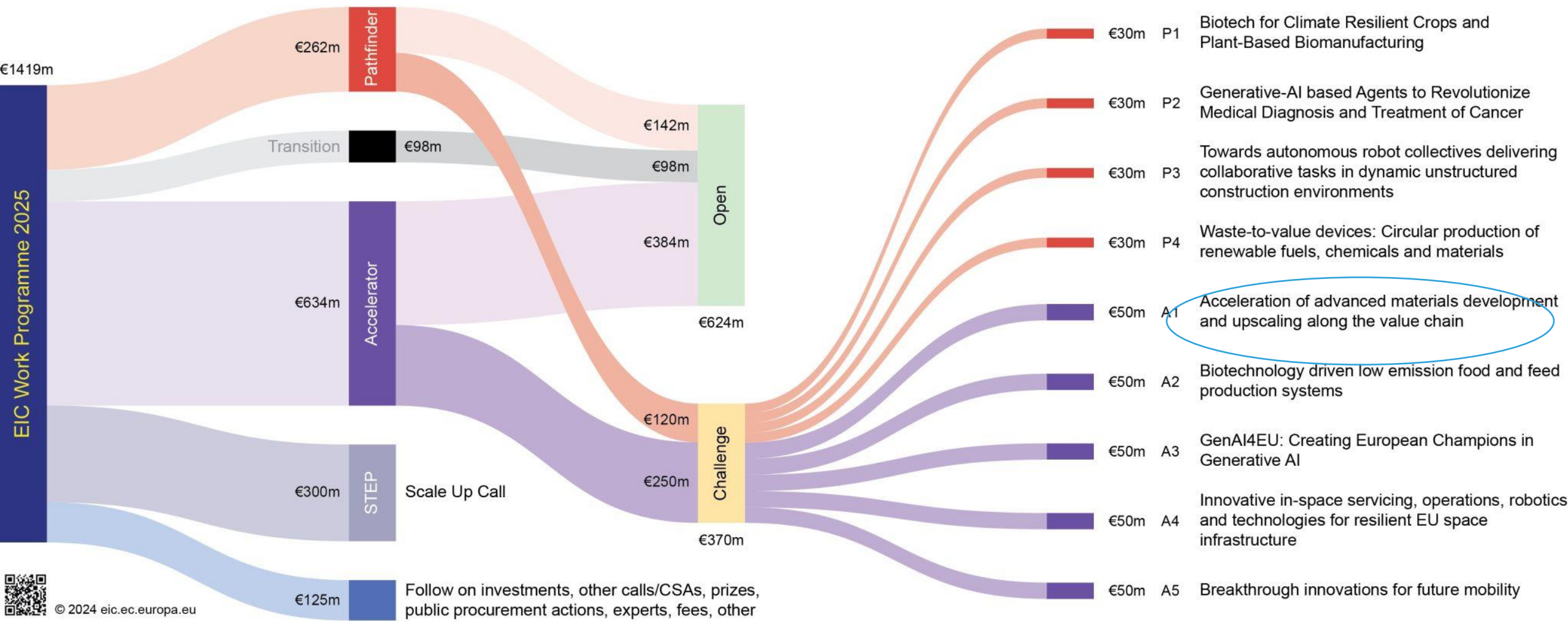
## Freedom in design & scalable manufacturing

Any optics, any display, any size

nanoWIRED  
connects...

- ✓ The most efficient connecting technology
- ✓ Bond any metallic or metallized surface
- ✓ Breakthrough value propositions
- ✓ Germany based, award winning company
- ✓ 50+ patents
- ✓ Company-owned technology centers in Europe and Asia

# The European Innovation Council WP 2025

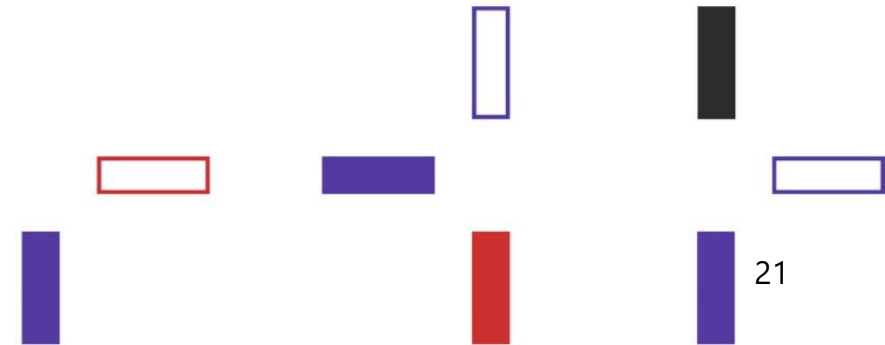


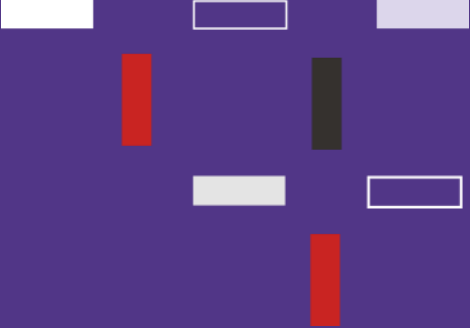
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- Pipeline of Functional Printing innovations is huge
- Challenges in this field need to be overcome and now, it's the moment to go for commercialization
- There's plenty of room for innovators and startups in the Semiconductors/Electronics value chain, especially targeting SUSTAINABILITY
- EIC is there to help





# Thank You

*FOR MORE INFORMATION,  
CONTACT US:*

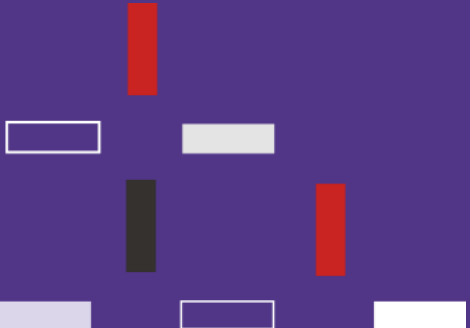
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