Emerging Printed Electronics Research Infrastructure

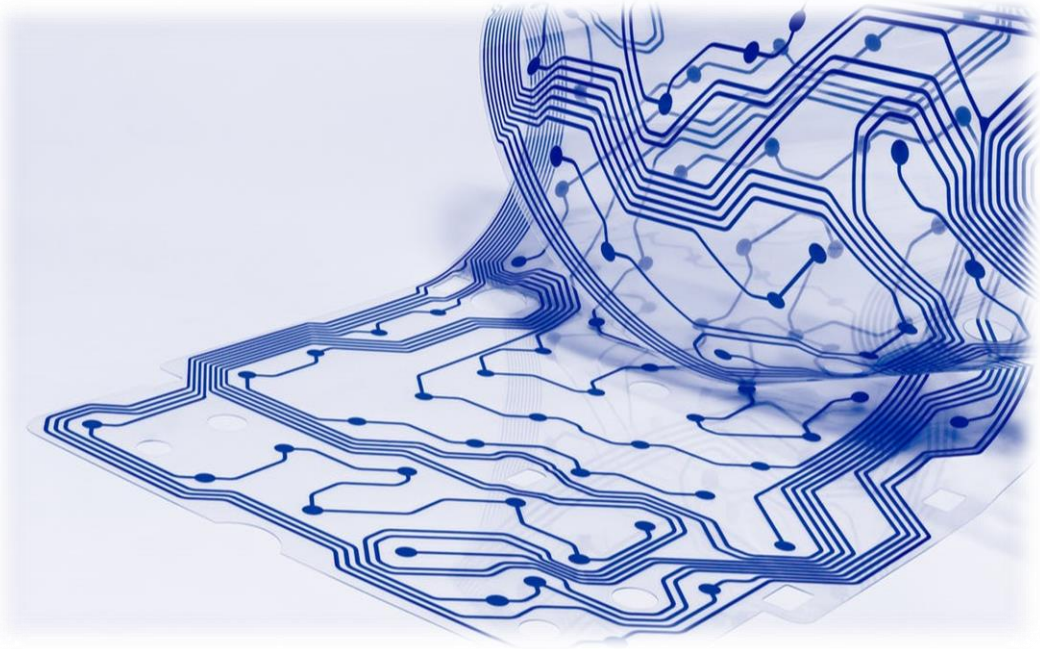
A Pioneer Research Infrastructure open to all

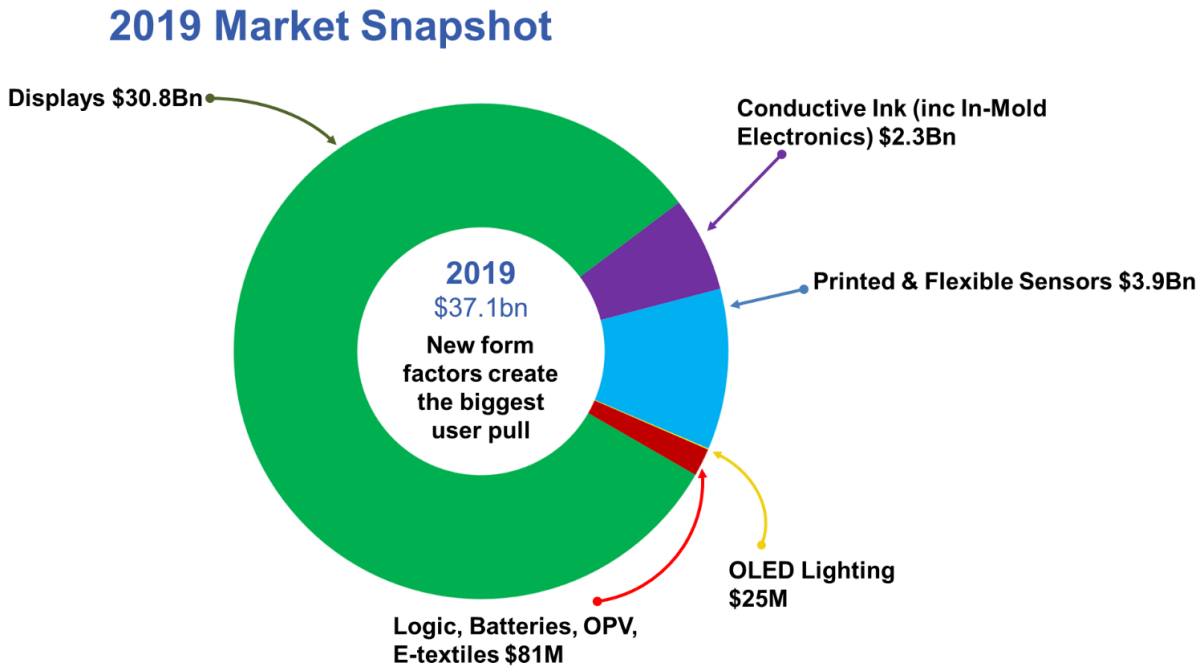
Pedro Barquinha, UNINOVA

The EMERGE project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement Nº 101008701

Flexible, Printed Electronics Market

- Flexibility, lightweight and thin, low-cost production, customization are some of the leading arguments
- Applications in retail, healthcare, wearables, vehicles, consumer electronics, IoT…
- $41.2 Billion in 2020 to $74 billion in 2030 (*IDTechEx Research, "Flexible, Printed and Organic Electronics 2020-2030"*).
- More representative growing areas: OLEDs, biosensors, printed conductive ink (predominantly for PV)





Source: IDTechEx Research

The EMERGE project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement № 101008701

Flexible, Printed Electronics: Threats, Opportunities

- 53.6M tons of e-waste in 2020, less than 18 % could be recycled.
- 44.7M in 2016, 74.7M foreseen in 2030 if radically new approaches are not implemented (Global E-waste Statistics Partnership (GESP) report)

Source: mikebiddle.com

New strategies should align with Green Deal.

- **Eco-friendly manufacturing processes based on abundant, recyclable eco-materials with much smaller environmental footprint**

EMERGE
Emerging Printed Electronics Research Infrastructure

The EMERGE project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement № 101008701

EMERGE overview

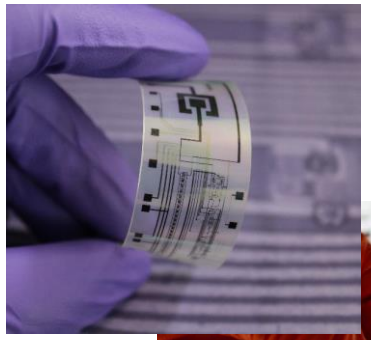
Emerging Printed Electronics Research Infrastructure, EMERGE

Pioneer EC funded action aiming to establish the first integrated, distributed research infrastructure supporting comprehensive user projects for leading-edge multi-and-trans-disciplinary research on sustainable flexible large-area printed electronics and photonics (FLAPEP).

- Call H2020-INFRAIA-2020-1; Topic INFRAIA-02-2020, Integrating Activities for Starting Communities
- Timeframe: 2021-2025
- 11 EU partners
- EU contribution: 6 177 816.00 €

Free-of-charge access to world-class infrastructure for >630 users, through >270 projects

Flexible, printed, green electronics



Functional materials

3D printing

Flexible energy sources

Smart diagnostic platforms

The EMERGE project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement № 101008701

EMERGE: A Pionner Research Infrastructure

Central Objective

Establish the first research infrastructure platform in the field of flexible, hybrid, printed electronics on recyclable substrates using eco-friendly materials and processes providing open access to RTOs, SMEs and industry

Specific Objectives

SYNERGIES

Create synergies between academia, small medium enterprises and industry.

MINIMIZE RISK

Minimize the risk of introducing FLAPEP technologies in new products.

SAVE TIME

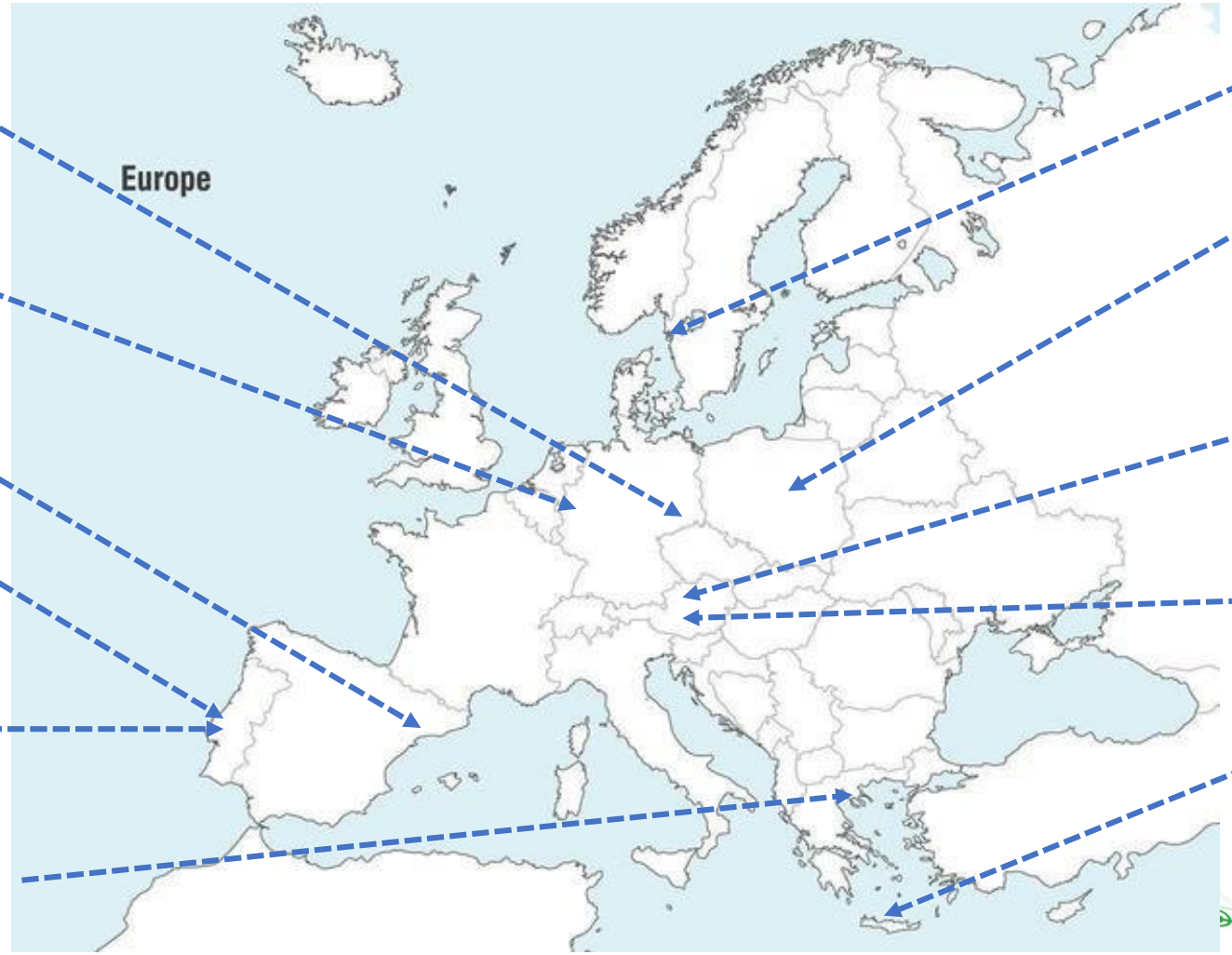
Shorten technology transfer time towards the market.

SUSTAINABILITY

Sustain the outputs generated by the project.

The EMERGE project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement № 101008701

EMERGE: 11 EU partners at the forefront of FLAPEP research



TECHNISCHE UNIVERSITÄT DRESDEN

HI ERN Helmholtz Institute Erlangen-Nürnberg

ICN2 EXCELENCIA SEVERO OCHOA Institut Català de Nanociència i Nanotecnologia

UNINOVA

ALMASCIENCE

ΕΘΝΙΚΟ ΚΕΝΤΡΟ ΕΡΕΥΝΑΣ ΚΑΙ ΤΕΧΝΟΛΟΓΙΚΗΣ ΑΝΑΠΤΥΞΗΣ Ινστιτούτο Τεχνολογιών Πληροφορικής και Επικοινωνιών

RI.SE

CEZAMAT

mcl

JOANNEUM RESEARCH

HELLENIC MEDITERRANEAN UNIVERSITY

EMERGE Emerging Printed Electronics Research Infrastructure

The EMERGE project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement № 101008701

EMERGE: Networking Activities (NA)

Transversal activities assuring that the innovative concept of EMERGE reaches to all and can continue beyond the action

NA1- Supporting Starting Infrastructure Community (Newcomers)

Setup, usage and standardization of procedures for TAs and JRAs

training, mobility and research secondments

NA2- Dissemination, Communication and Exploitation Strategy

EMERGE Branding

promoting internal and external FLAPEP and multifunctional materials networking

Industrial innovation and knowledge transfer, pathways to take EMERGE beyond project limits

NA3- Development of e-infrastructure for data and information management

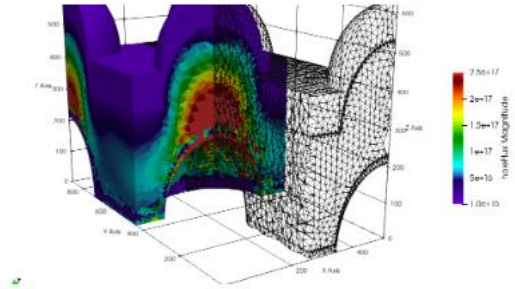
Development of e-infrastructure for data and information management

Building of AI-powered Knowledge Repository (Kbest) and Data Analysis Services

The EMERGE project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement № 101008701

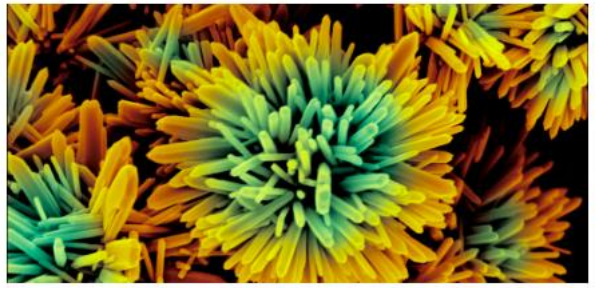
EMERGE: Transnational Access Activities (TA)

Users can apply to projects in any (or multiple) of the 4 TA:



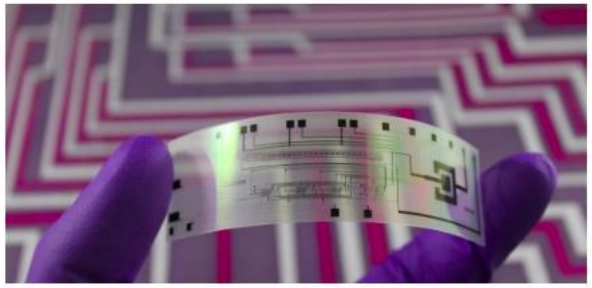
TA1 - Theory: Modelling, simulation, and design of materials, devices and systems

- Device design and architecture
- Modelling and simulation



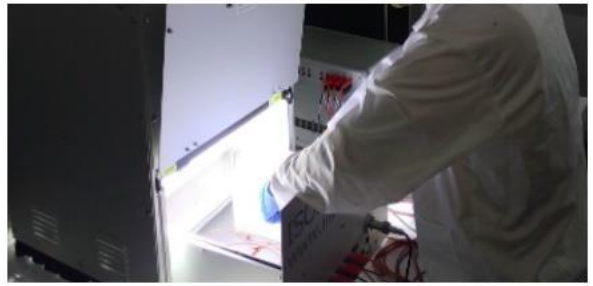
TA2 - Material synthesis and ink formulation

- Chemical & physical techniques
- Materials characterization



TA3 - Prototype fabrication

- Device preparation
- Functional 2D&3D printing
- Industrial printing
- Nanoimprint and laser patterning
- Vacuum assisted deposition



TA4 - Characterization of prototypes and demonstrators

- Device metrology and characterization
- Validation and standardization

The EMERGE project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement № 101008701

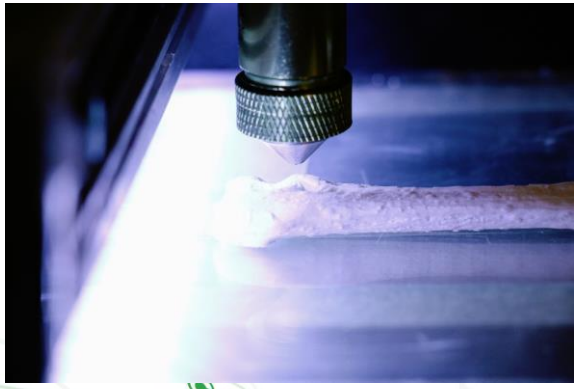
EMERGE: Joint Research Activities (JRA)

TA supported by three cutting edge JRA programmes (intra-consortium) to develop new enabling methods and advanced services to be promptly transferred to the TA users' program by the end of the project:

- JRA1 – Research on hybrid printing setups with quantitative in-line measurement methods for high precision fabrication of bio-nano systems

- JRA2 – Research on high throughput novel inks/pastes synthesis

- JRA3 – Research on Functional 3D printing for multifunctional smart objects with interactive free-form surfaces



The EMERGE project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement № 101008701

EMERGE: Steps for proposal submission/implementation

All process through EMERGE website: https://emerge-infrastructure.eu/

All described at EMERGE website:

- Eligibility criteria
- EMERGE boards and roles
- Proposal requirements
- Proposal evaluation
- Travel and subsistence support

The EMERGE project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement № 101008701

EMERGE: Steps for proposal submission/implementation

All process through EMERGE website: https://emerge-infrastructure.eu/

Proposal composed by:

- General data – Title, primary/secondary TA, keywords, maturity of work…
- Scientific case – context and objectives, samples/materials required, workplan, expected outputs, references
- Experimental plan – selection of required tools from EMERGE catalog and selection of preferred institution(s) to perform the project

The EMERGE project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement № 101008701

EMERGE: Steps for proposal submission/implementation

All process through EMERGE website: https://emerge-infrastructure.eu/

- Technical Liaison Office (TLO) checks project feasibility
  - If accepted, follows for external experts review

- External reviewers selected by the Selection Committee Board (SCB), from a poll of >100 reviewers
- SCB collects reviewers' reports and ranks the proposals for each call

The EMERGE project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement № 101008701

EMERGE: Steps for proposal submission/implementation

All process through EMERGE website: https://emerge-infrastructure.eu/

- TLO works on a suitable workplan with the users, having in mind user requirements and resource availability within EMERGE infrastructure

- **Free-of-charge access to EMERGE facilities by users to perform their projects**

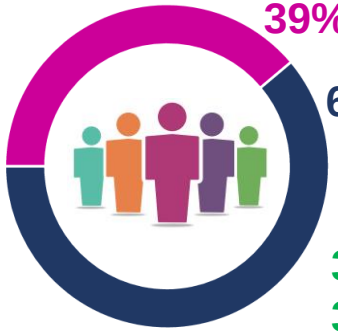
- Users upload a user feedback form for quality control and a short experimental report

New calls for projects open each 3 months

The EMERGE project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement № 101008701

Statistics from 3 calls opened in 2022

Projects and gender balance



39% Female

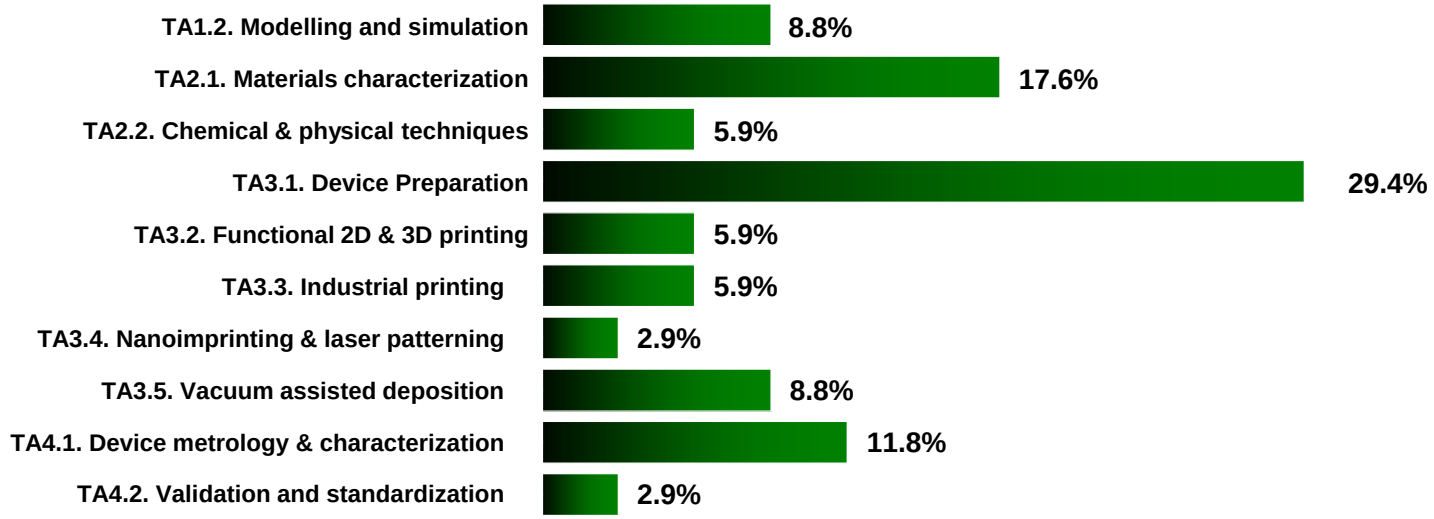
61% Male

3 Calls

34 Projects

36 Participants

Distribution of projects per installation



Maturity of the project idea

23.5% Basic ideas

41.2% Lab scale

35.3% Proof-of-concept

The EMERGE project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement № 101008701

Thank you

Coordinator – Professor Rodrigo Martins, UNINOVA-CEMOP

Email: info@emerge-infrastructure.pt

Website: https://emerge-infrastructure.eu/

Linkedin: https://www.linkedin.com/company/emerge-infrastructure/

The EMERGE project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement Nº 101008701