



ZENTRUM FÜR ORGANISCHE ELEKTRONIK | UNIVERSITÄT ZU KÖLN

COPT

Hosting Technology Start-Ups

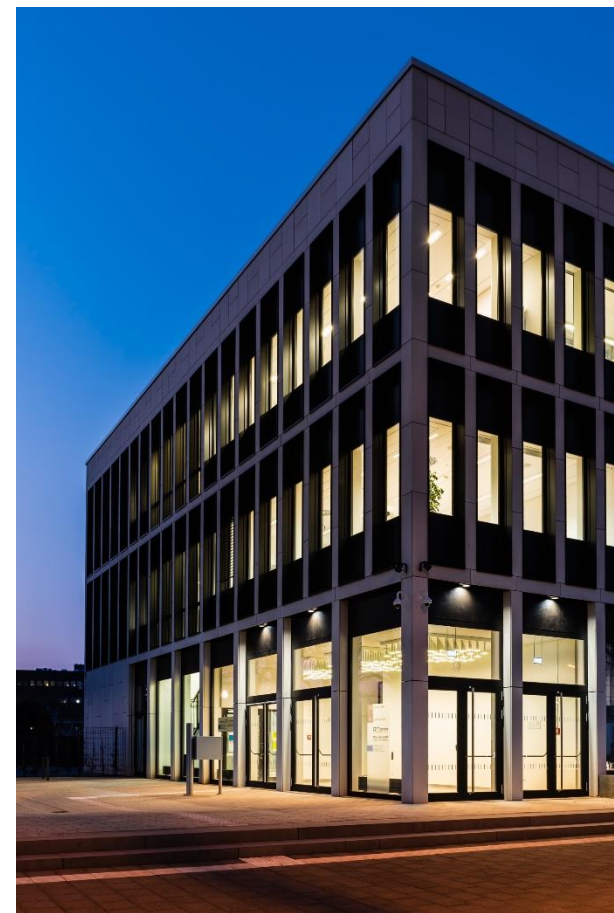
Stephan Kirchmeyer

October 18, 2019 (Florence)

- Fact and Figures
- The COPT-Building
- COPT's Equipment
- COPT's Organization
- COPT's Network
- Projects with Start-Ups
- General Approach towards Start-Ups
- Overcoming Barriers for Start-Ups
- Market and Technology Intelligence for Start-Ups
- Learnings
- Conclusions




- Technology transfer institute for organic and printed electronics
 - Hosting Technology Start-Ups
- Founded by the University of Cologne
 - Non-profit organization
 - Business orientated
- COPT-Building
 - Opening in on October 2015
 - 1000 m² of working area
- Investments
 - 7 Mio. building
 - 5 Mio. equipment
- Personnel
 - 12

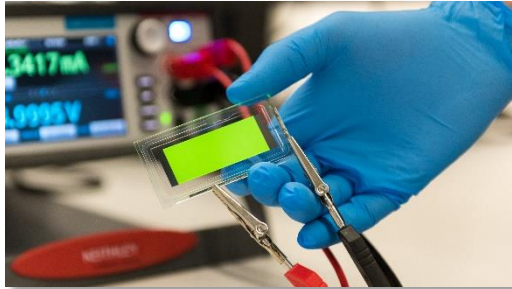




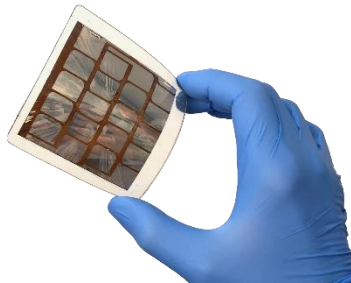
Source: OE-A

COPT Center is member of the 

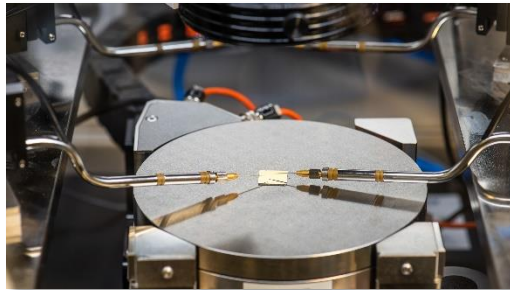
Organic LED (OLED)



3. Generation solar cells



Active and passive electronic components:
Transistors, sensors, actuators



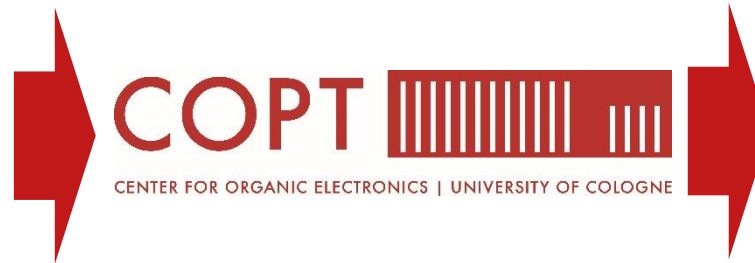
Automobile, mobility



General lighting



agriculture, sports, medical





Space for Technology Start-ups

- Laboratories
- Clean Room
- Office Space



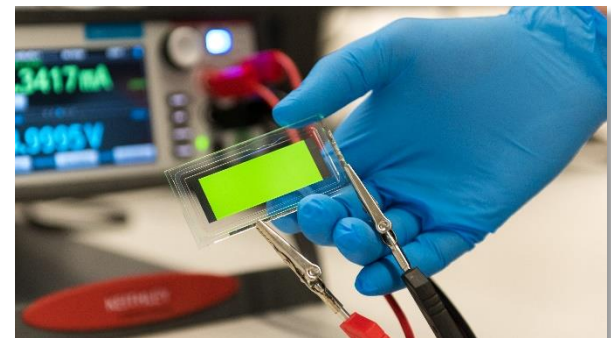
High-tech

- Deposition from the gas phase (Sputter, CVD, ALD)
- Coating and printing
- Laser structuring, cutting and annealing
- Analytics (optical, electrical, long-term)



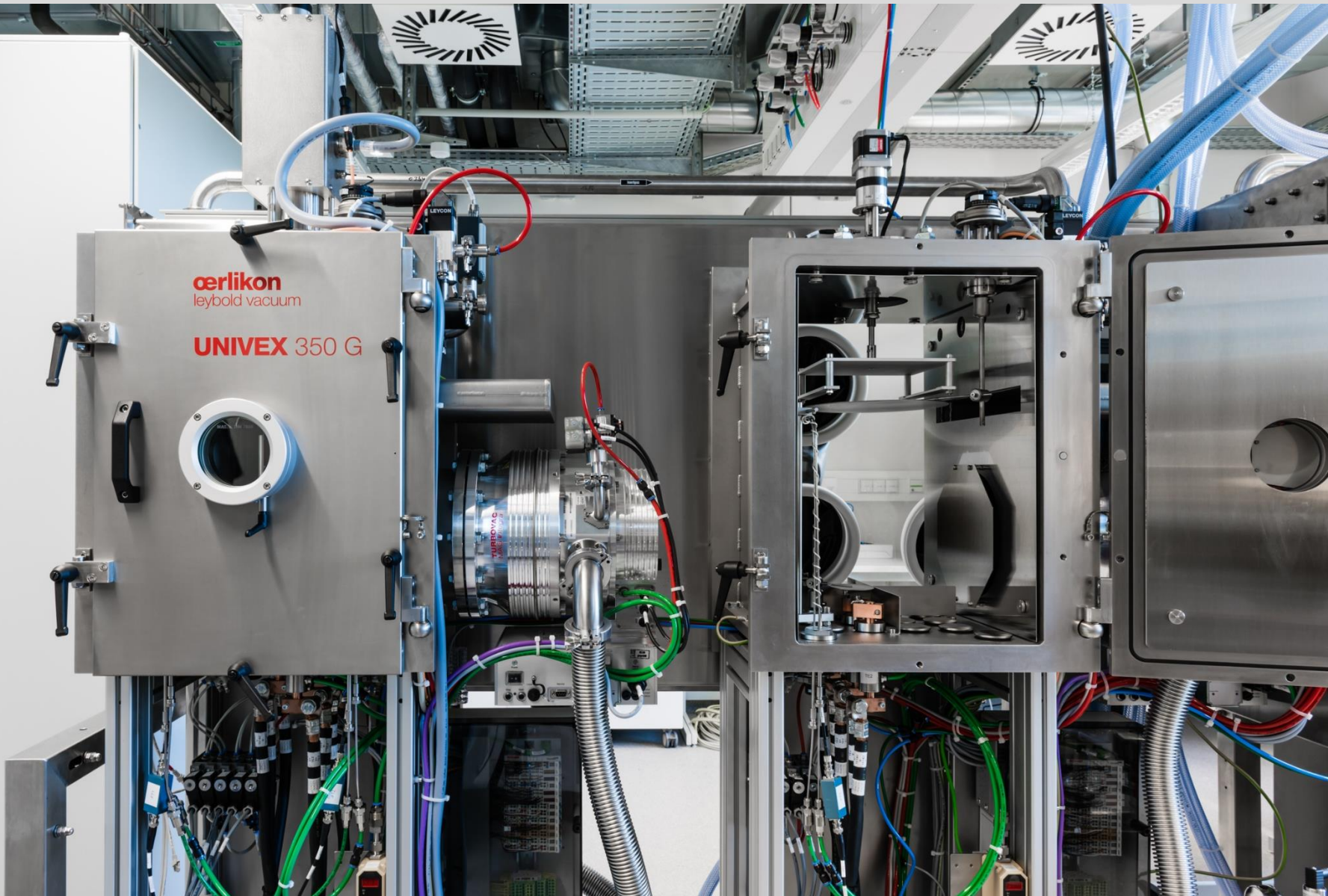
Know-how

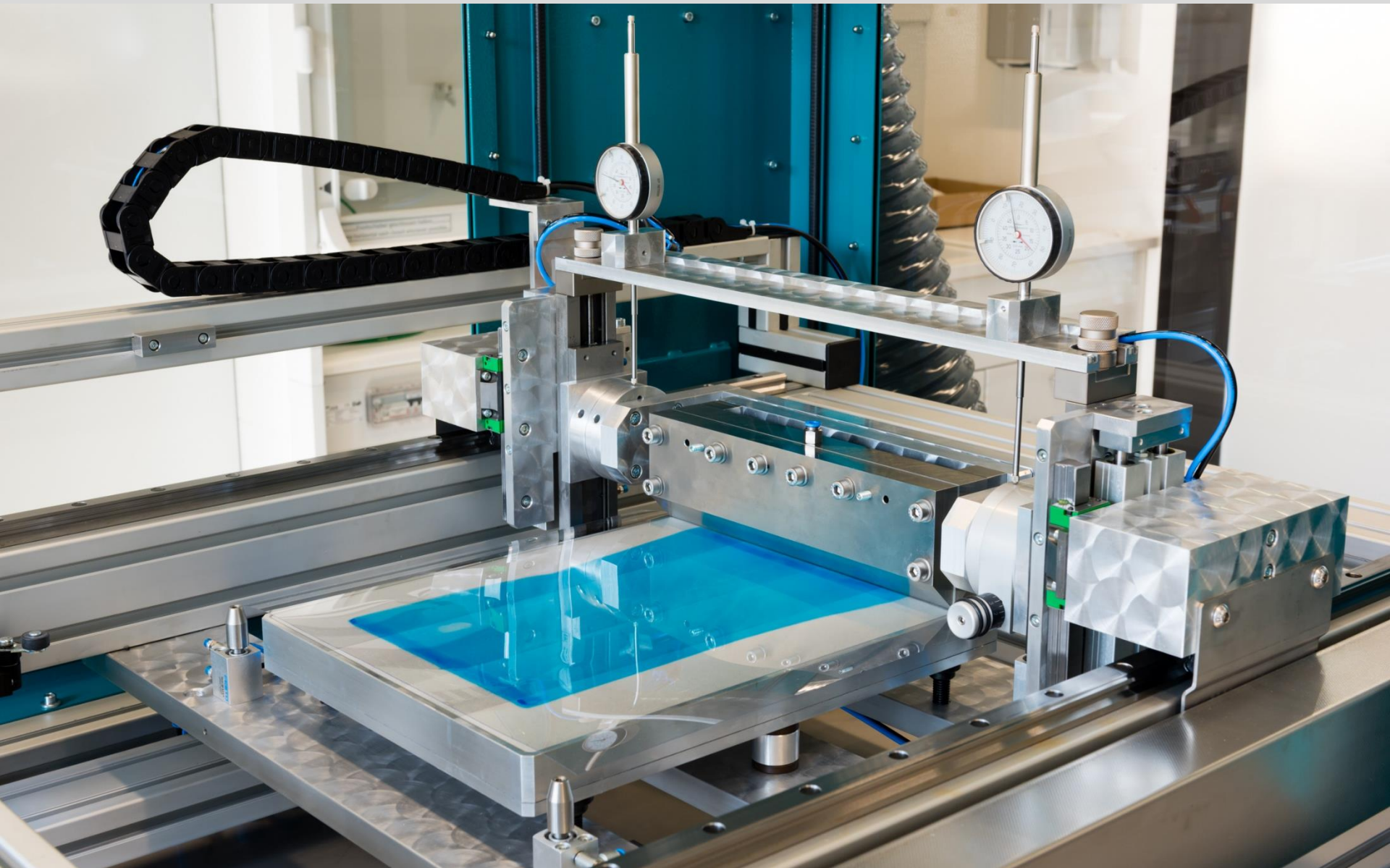
- Initiation of public funded projects
- Prototyping
- Consultation
- Education

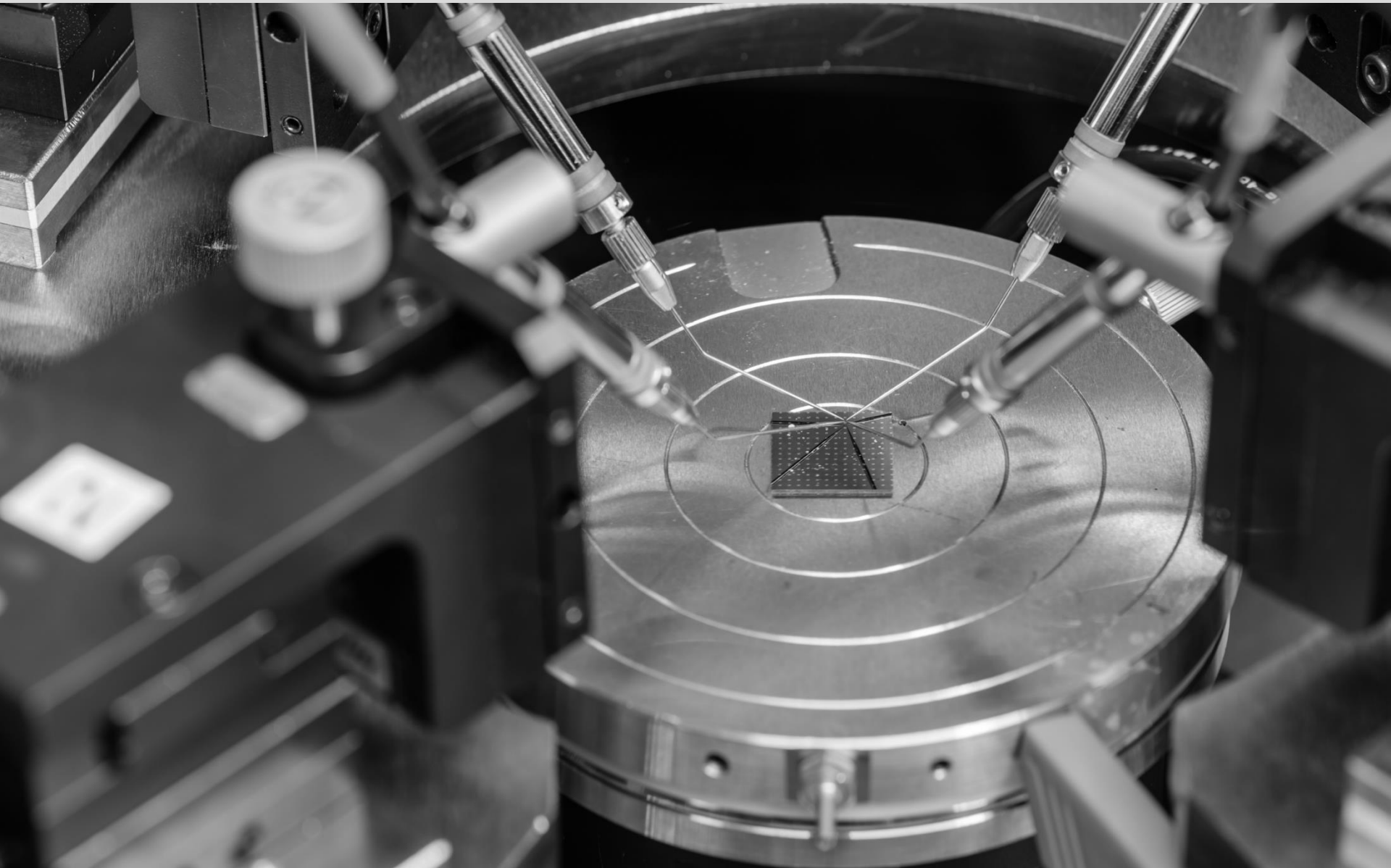


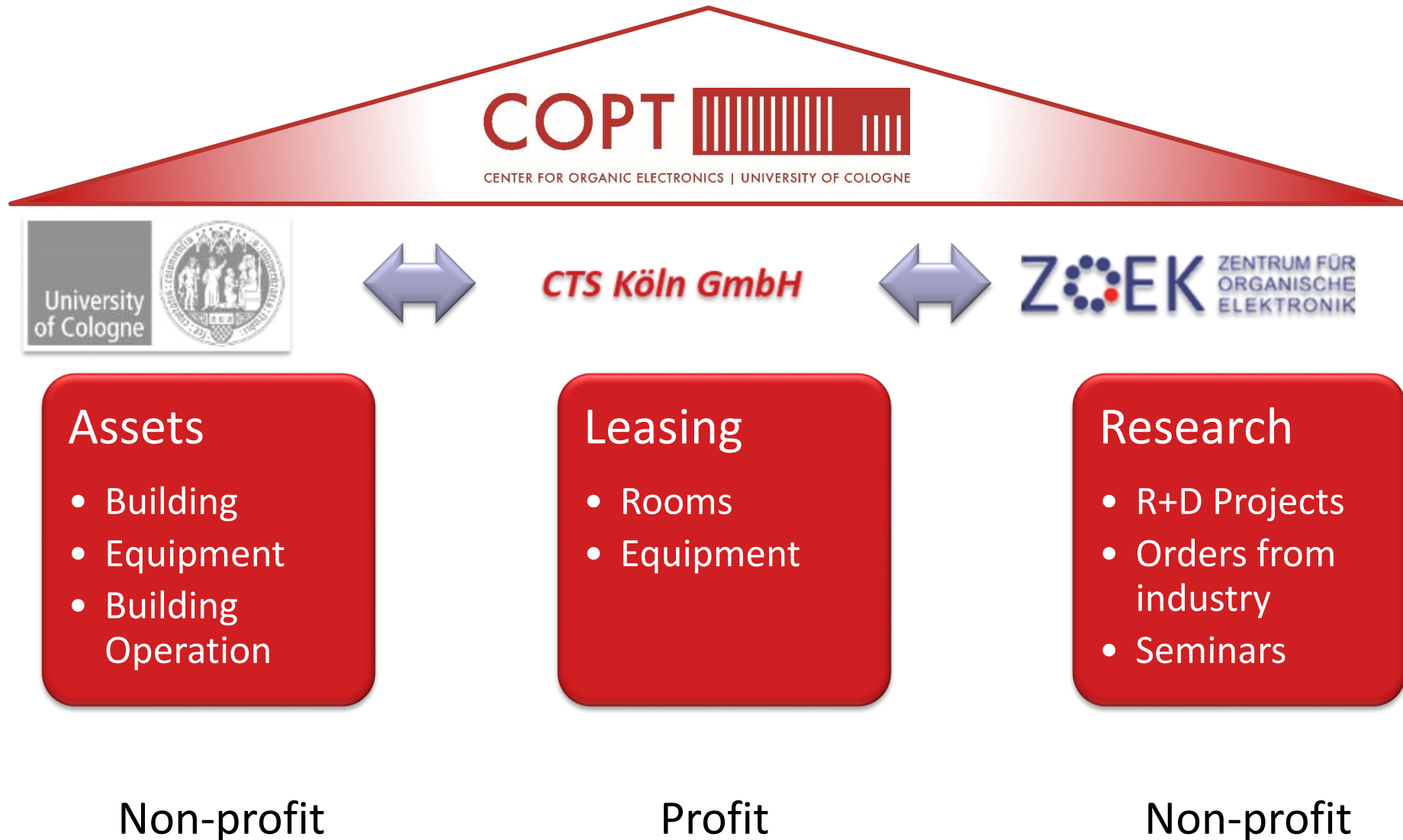


Univex 350g Sputtering Equipment (Leybold)



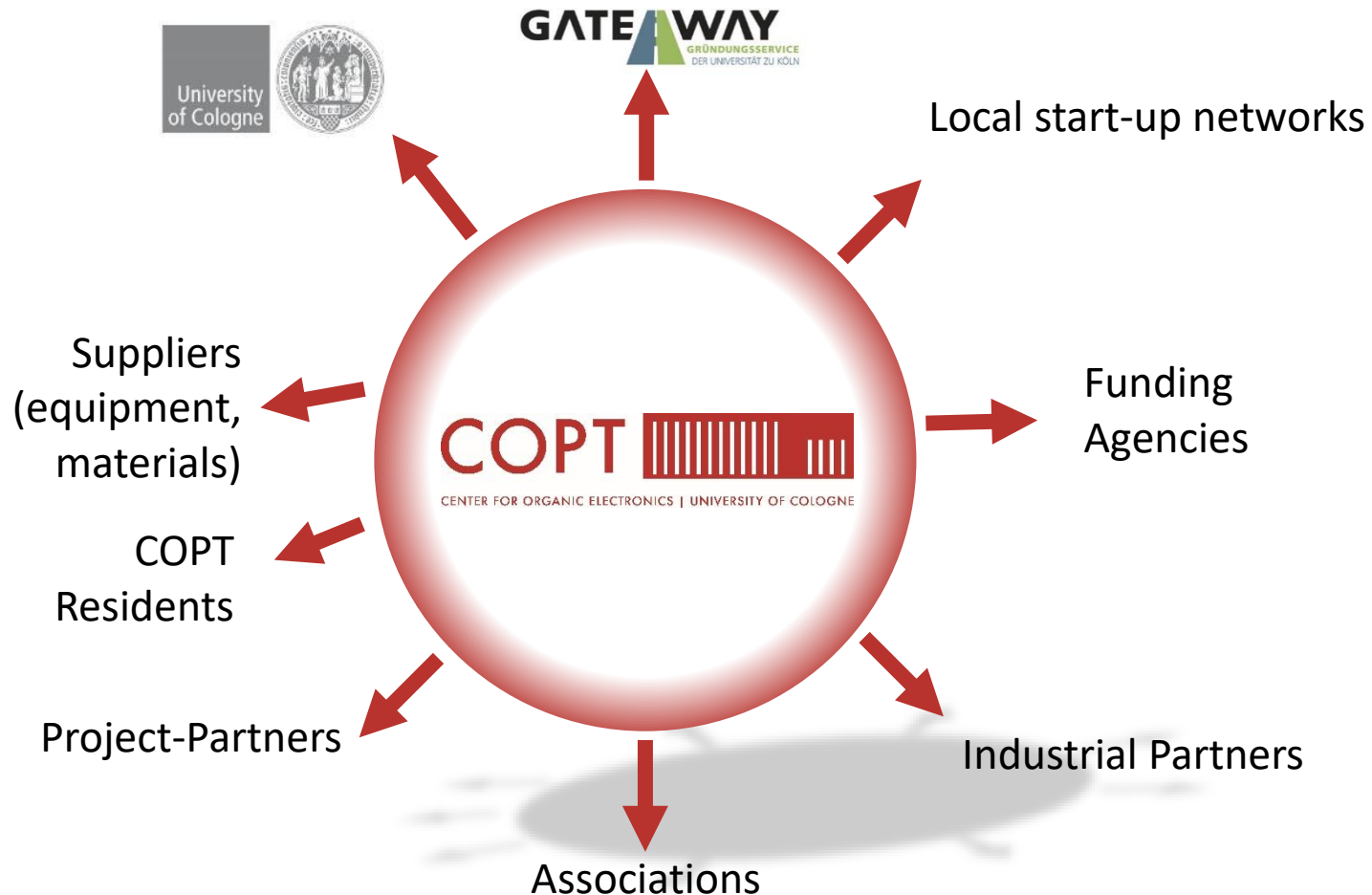






Attract Technology Start-Ups to COPT

Build competence and reputation



Acquire Funding Money

Industrial Partners



Research Institutions

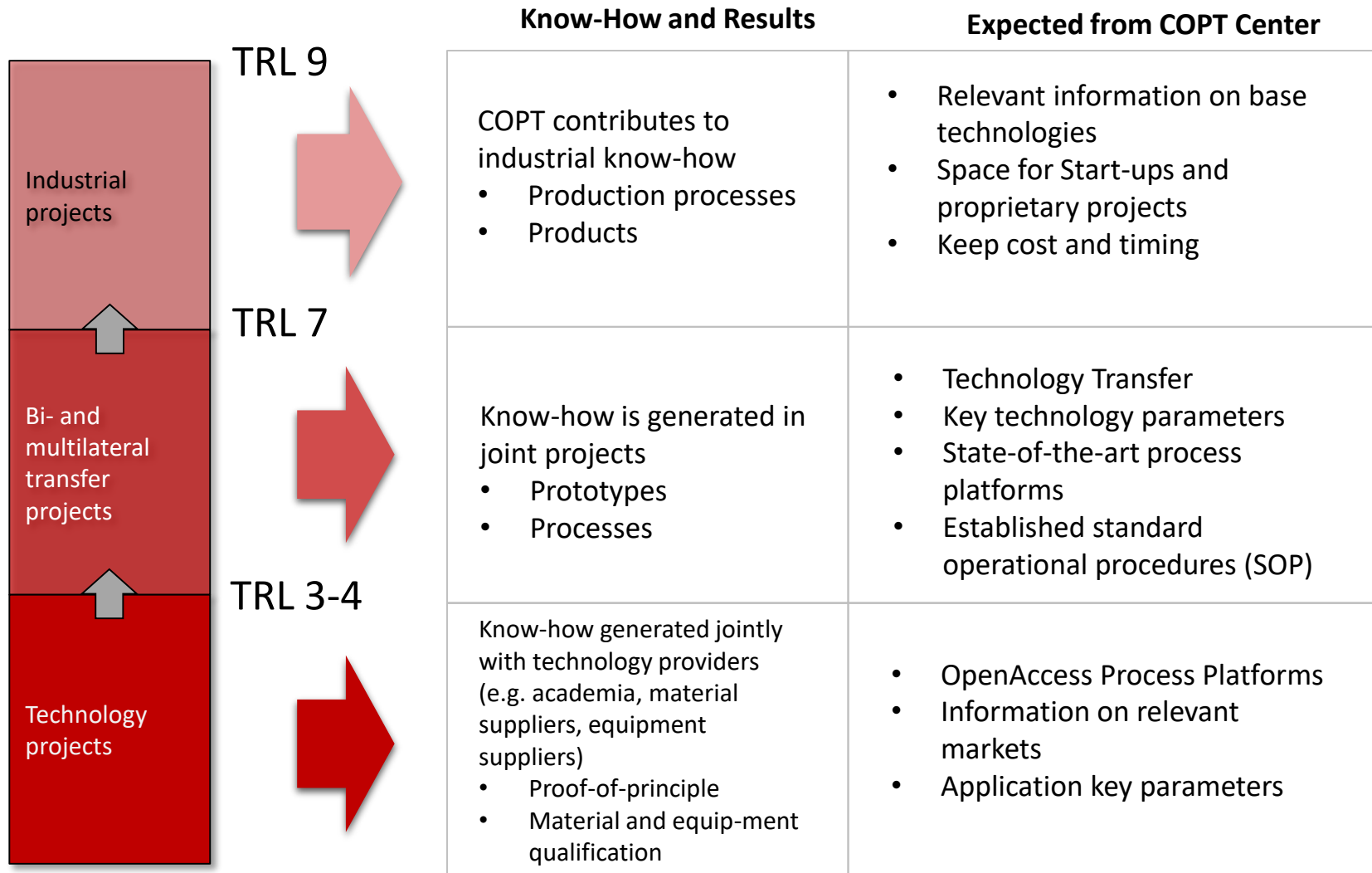


Networks





- Energy independent devices (Internet of things)
 - Using organic solar cells
- Residing at COPT from 2016 – 2018
- Moved to new facilities in 2019 to build a pilot line
- Enerthings is partner of COPT in public funded projects **PeroBoost** (2016-2019) and **Enerscale** (2019-2021)
- „Without COPT we would not have achieved what we have reached today“



*) TRL: Technology readiness levels (https://en.wikipedia.org/wiki/Technology_readiness_level), 3-4: Proof-of-Concept (R+D), 7: System prototype demonstration in an operational environment (Pilotierung), 9: Actual system proven through successful mission operations (Starting Production).

OLED 3D

- 3D-integrated rear lights
- Freedom of shapes and design using the OLED technology

Funded project with partners



Product



FIMO

- Housing of a navigation system made via injection molding
- Robustness of OLED lighting elements during the injection molding process demonstrated

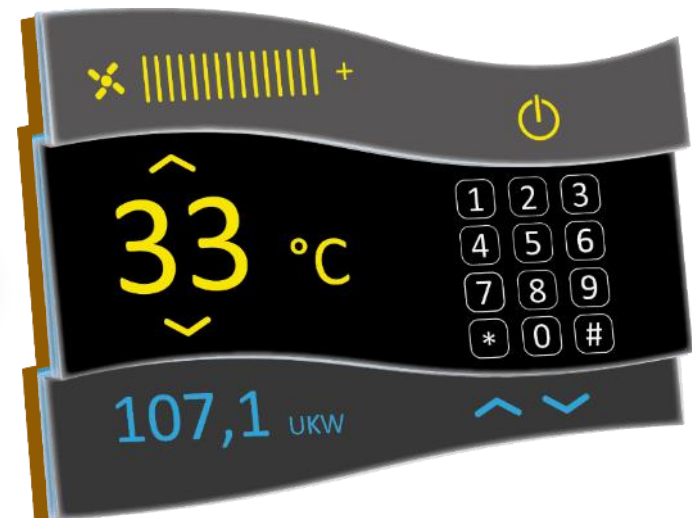
dekOLED

- New project dekOLED will start in April 2017
- Integrate OLED und sensor elements in a single plastic part

Public funded project with partners



Public funded project with partners



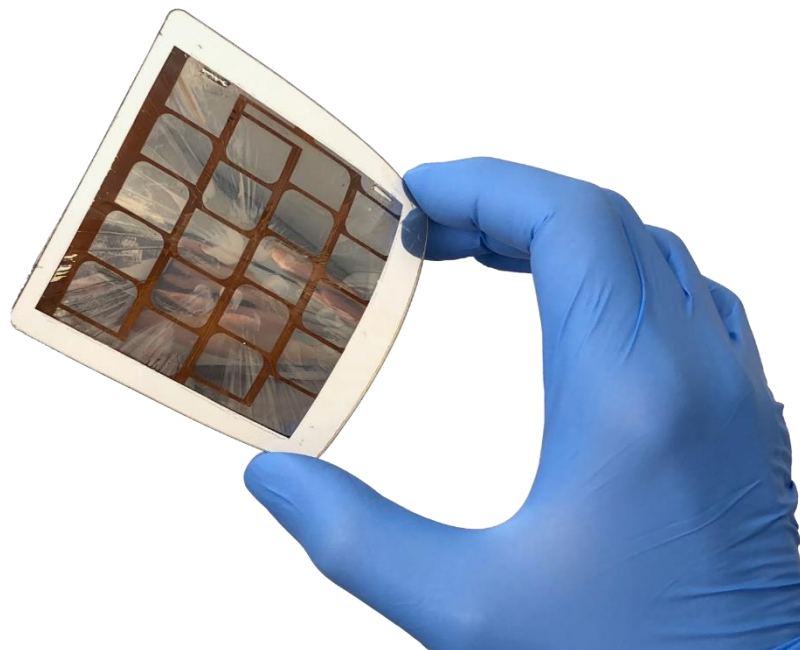
Graphical animation of a potential prototype

PeroBoost

- Modules with an area of 56 cm²
- 10 % energy efficiency
- Solvent based wet coating process at air
- Scalable
- Long term stable

Enerscale

- Started January 1, 2019
- Process optimization





Reduce technology risks



Acquisition of public funding



Profit from in COPT's extended network

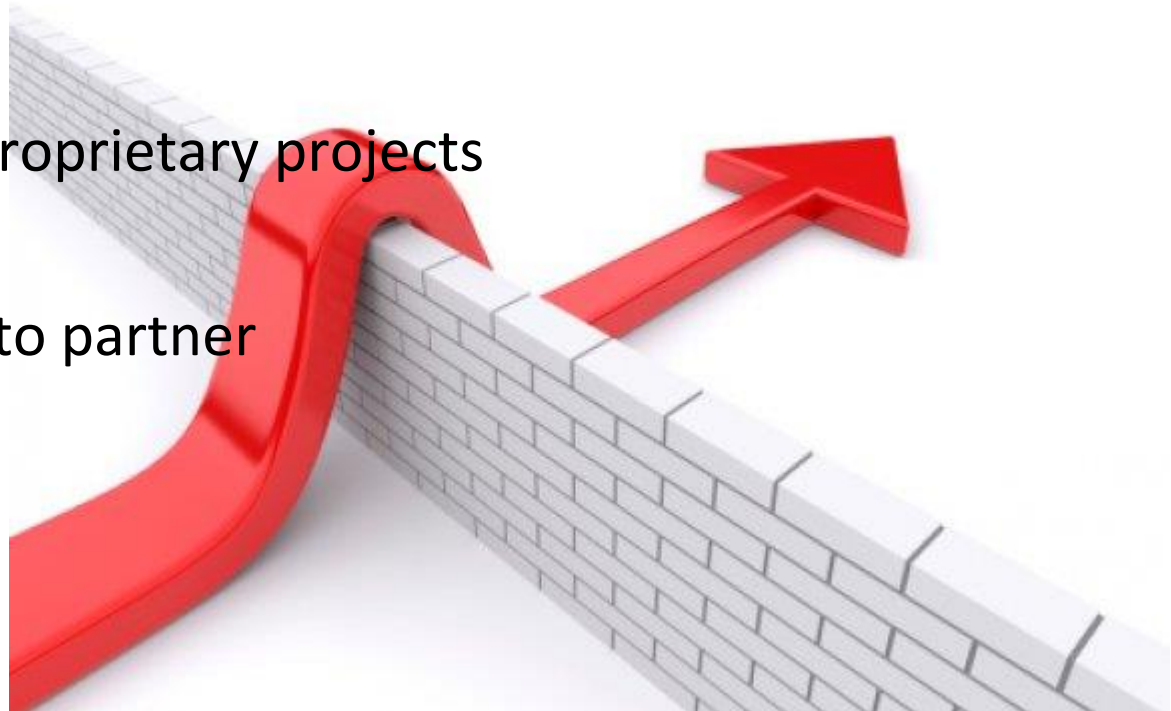


COPT Center, a working area between university and industry








Project results enable profound decision on investments

- All partners treated equal, no entry fee
- OpenAccess process platforms
- „Privacy“ areas for proprietary projects
- Inventions assigned to partner



- 6 major industries*) represent the target markets of organic and printed electronics

-  Packaging/Printing
-  Consumer Electronics
-  Automotive
-  Lighting
- Pharmaceutical
-  Energy



*) OE-A :Organic Electronics Association
source: OE-A Business Climate Survey, Semiannual Questionnaire to OE-A Members

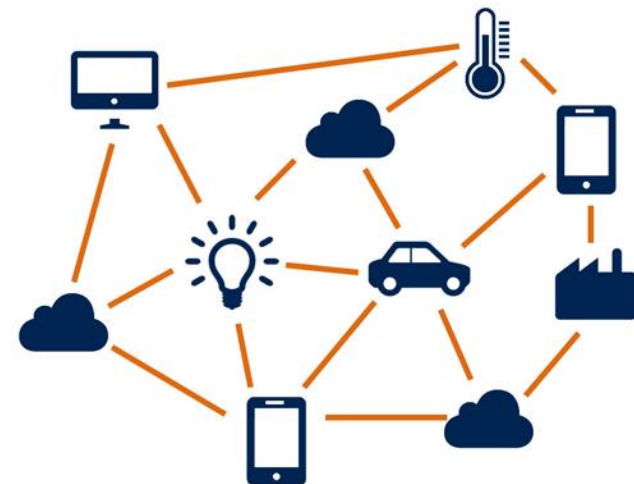
Photos: OE-A

Trends

- Everything can have an electr(on)ic function
- Everything is remote controlled
- Everything can deliver data
 - Tooth brush, toilet, mirror
 - Stove, refrigerator, washing machine
 - Plug, Switch, light bulb, door bell, rain sensor, wind sensor
 - Car, bike, bike helmet

Motivation

- Sell Data
- Automatization
- Identification



- Smart Homes
- Smart Living



Photos: Kirchmeyer

- Sports, Wellness, Medical



Sensor Saddle



Flexible PV-Cell



using
haptic
access
exper



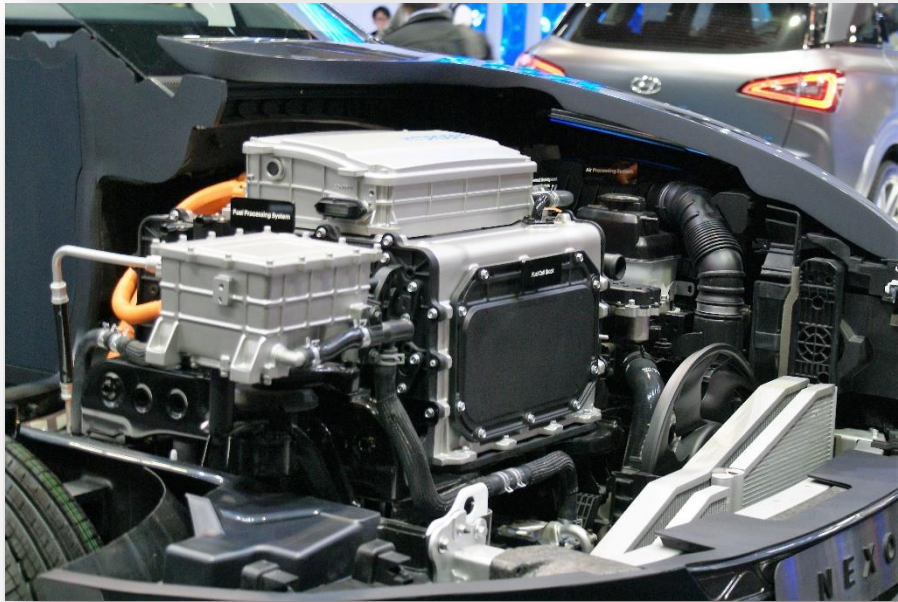
Sensor Pad



Muscle Stimulator

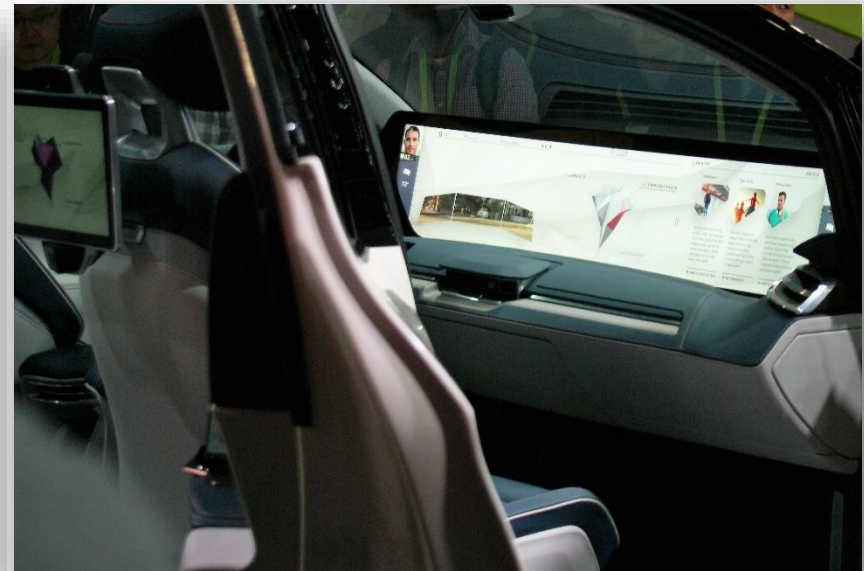
Photos: Kirchmeyer, CSEM

- Big topics
 - Alternative (electric) drives
 - Autonomous vehicles



Photos: Kirchmeyer

- ... will change the design of cars
 - ... outside
 - ... and inside



Photos: Kirchmeyer

Near future trend:

- More interior displays
- Touch switches
- Haptic feedback (needed)
- Snap-in modules with electronic functions



Photo: Kostal



Photo: Tactotek

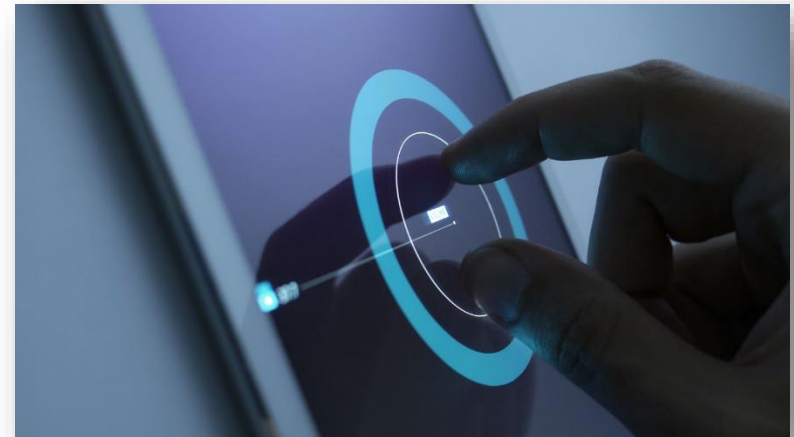
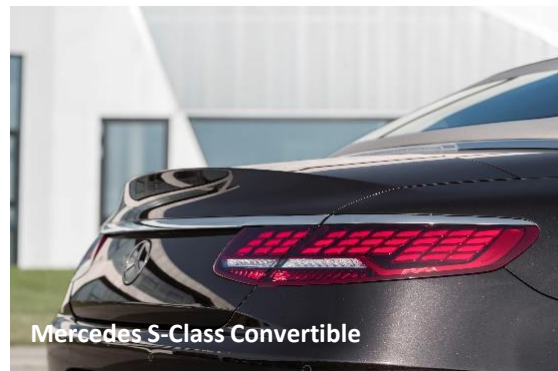


Photo: Tactotek

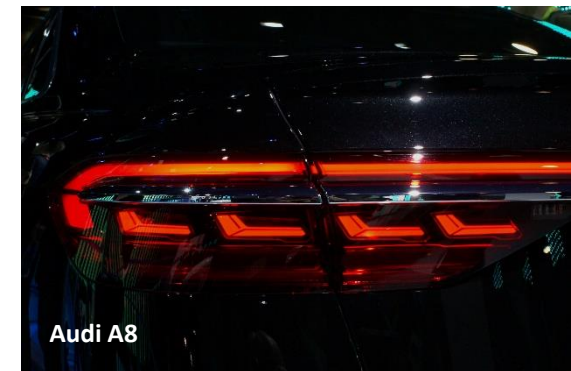
- BMW launched in 2016 the BMW M4 GTS as first production vehicle with OLED rear lights
- Audi launched the Audi TTRS with OLED rear lights in autumn 2016.
- Mercedes launched S-Class Coupé and Convertible with OLED rear lights in 2017
- Audi launched the A8 with OLED rear lights in 2017



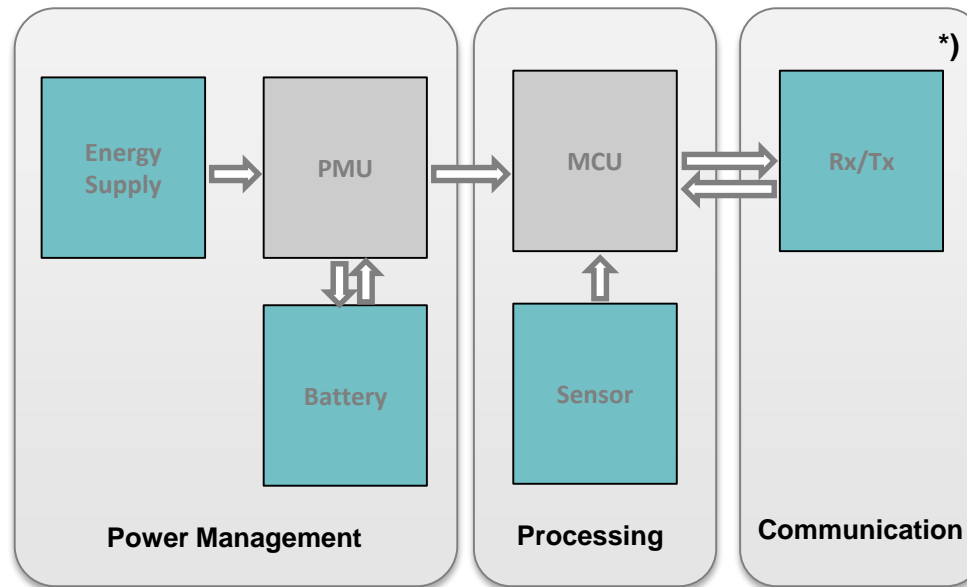
2016



2017




2017



The switching speed of transistors is limited by

- charge carrier mobility (material property) and
- channel length (manufacturing technology).

 Opportunity for OPE-components

- Hybrids bridge the technological gap between all-printed electronics and market demand

*) adopted from M. Korell, A New energy storage technology for the Internet-of-Things, LOPEC 2016



- **Speed and flexibility is essential**

- Fast moving technology and markets
- Limited opportunity-window
- Time is money for start-ups
- COPT Center as mediator between long term thinking (University) and short-term thinking (industry)



- **Money**

- Initial public funding is essential, but adds restrictions
- Cost-based pricing in general is OK
- flexibility (e.g. pricing) is essential
- Technology start-ups as customers



- **Space**

- Good infrastructure is essential (temperature, humidity, particles)
- Space has to be restricted, otherwise it is difficult to control cost
- Additional storage space to allow changes in equipment

- COPT is set up to support technology start-ups active in the area of organic and printed electronics with
 - Laboratory and office space,
 - High-tech equipment for deposition, structuring and analytics, and
 - know-how to understand the technology opportunities as well as challenge and the market needs.
- Besides COPT is initiating projects
 - To keep in-house state-of-the-art technology and
 - To support start-ups to develop their specific technology



CENTER FOR ORGANIC ELECTRONICS | UNIVERSITY OF COLOGNE

Dr. Stephan Kirchmeyer

stephan.kirchmeyer@copt-zentrum.de

COPT Center for Organic Electronics, University of Cologne

Luxemburger Str. 90 | 50939 Köln

www.copt-zentrum.de



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