

Integration elektrischer Funktionalitäten mittels 3D-Inkjet-Druck in (Struktur-)Bauteile



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Quelle: ChatGPT auf Basis eigener Fotos

Fraunhofer Institute for Applied Polymer Research IAP

—
Director: Prof. Dr. Alexander Böker

Die Fraunhofer-Gesellschaft

Auf einen Blick

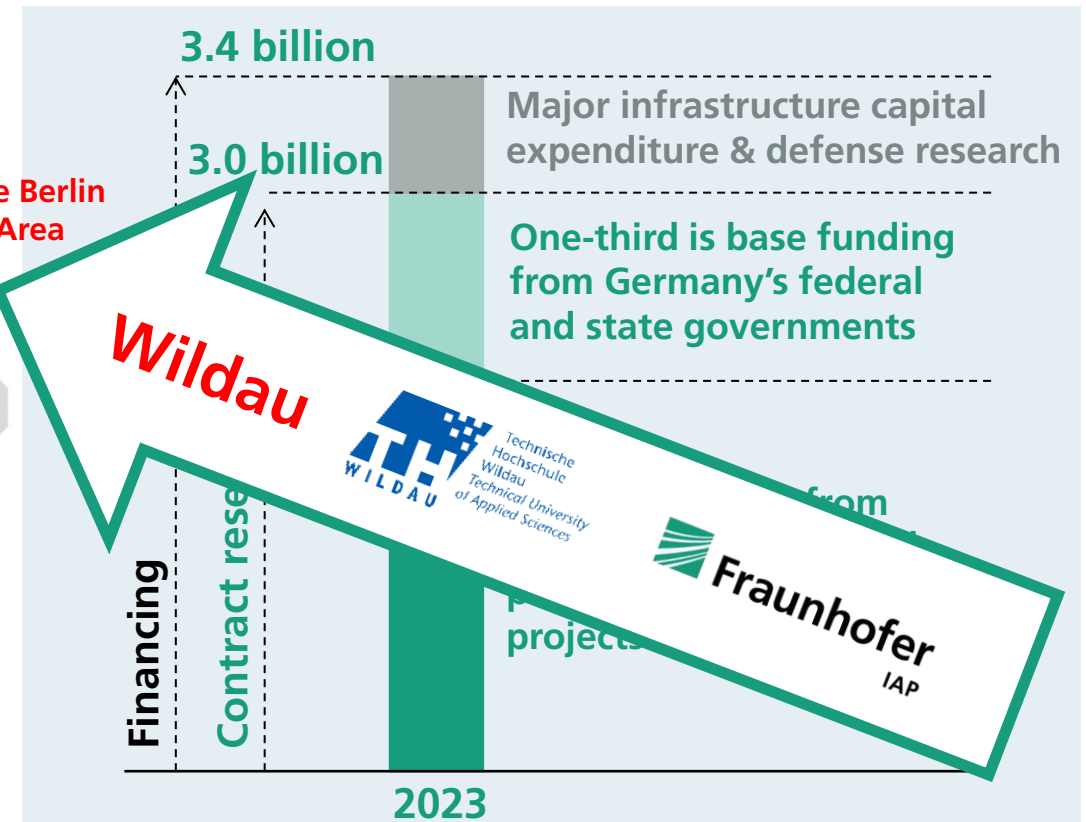
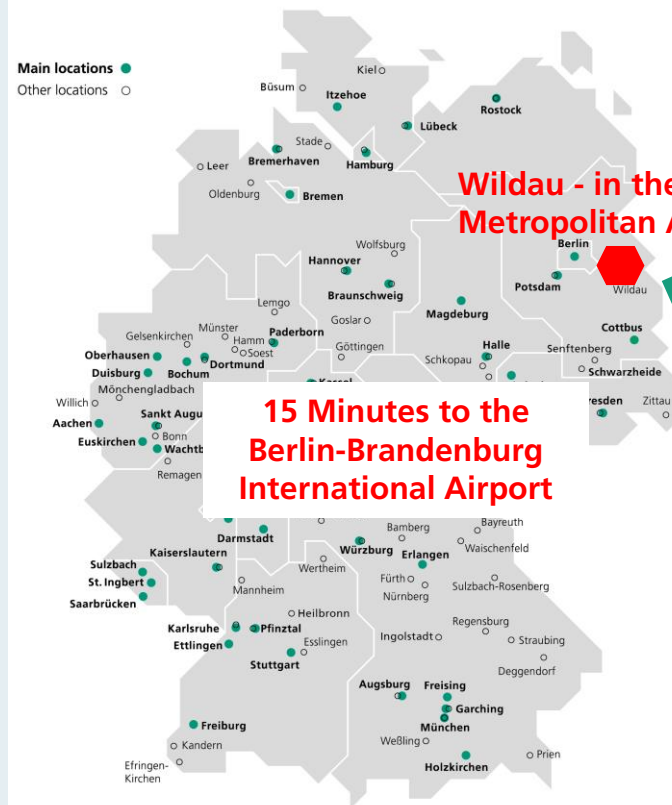
Applied research with a focus on key future-relevant technologies and the commercialization of findings in business and industry. A trailblazer and trendsetter in innovative developments.



> 32 000 employees



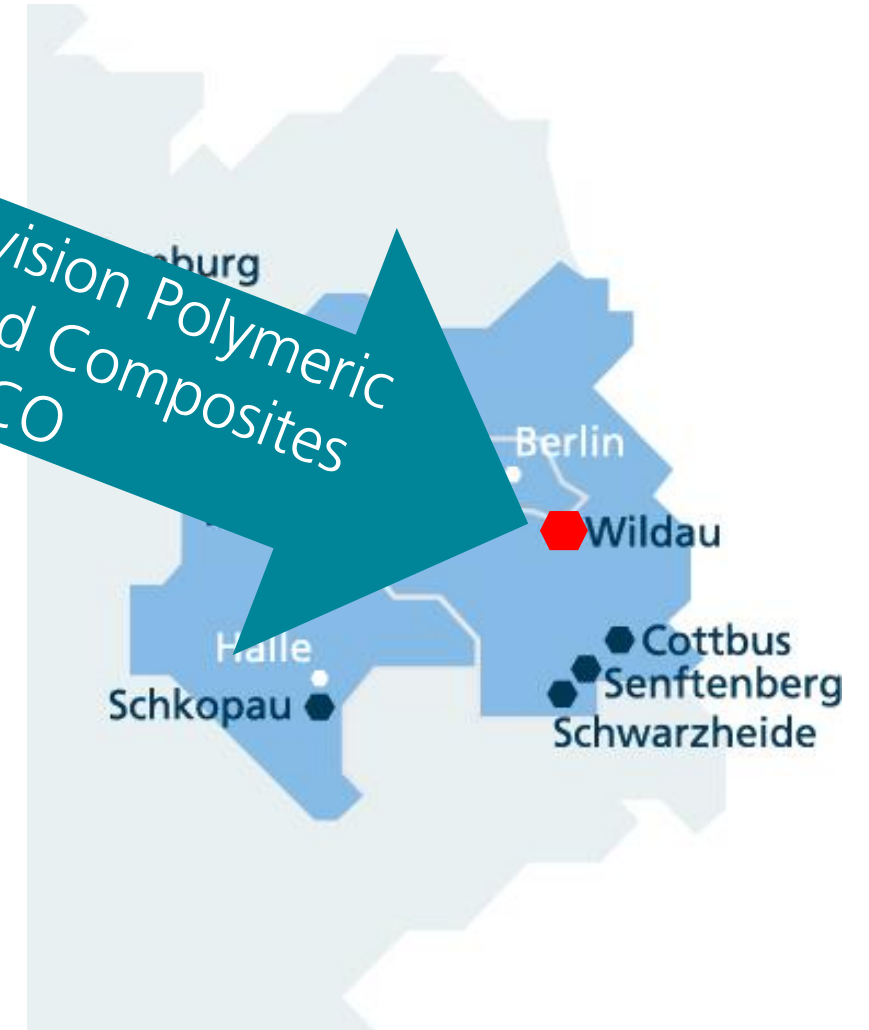
76 institutes and research units



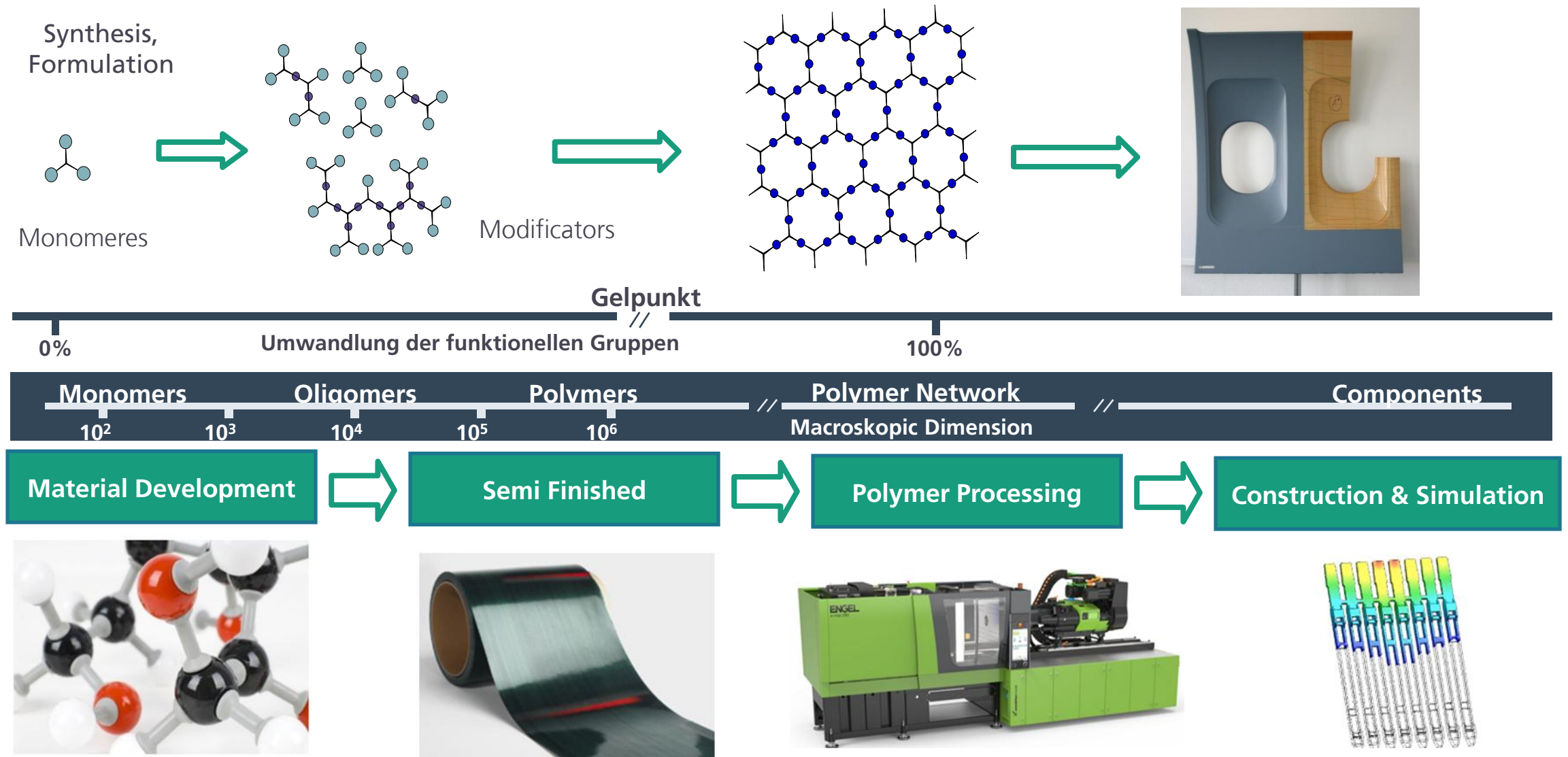
Fraunhofer IAP at a glance



Research Division Polymeric
Materials and Composites
PYCO



From Monomer (Chemistry) via Simulation to the Component



Urban Biospaces

Use of Cities for Food Production



... in empty
Factories



Subway Taiwan



... in empty buildings



... in subway tunnels

Ein Kabelsatz besteht nicht nur aus ein paar Leitungen und Steckern ...



Quelle: ChatGPT auf Basis eigener Fotos

Ein Kabelsatz besteht nicht nur aus ein paar Leitungen und Steckern ...



Quelle: ChatGPT auf Basis eigener Fotos

Funktionales Drucken auf (und in) Verbundwerkstoffen



Funktionsintegration im Leichtbau

- Gedruckte Elektronik -

Design of Printing Layout

Generation of NC Program

Simulation

Printing

Sintering

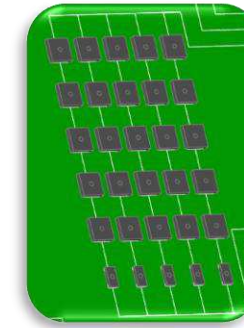
- Motion 3D

- G-Code

- Maschine Simulation

- Piezo or InkJet
- Pick & Place

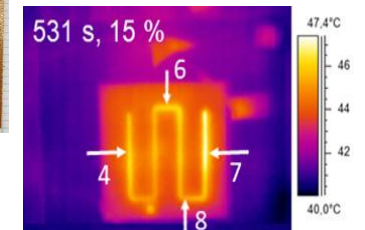
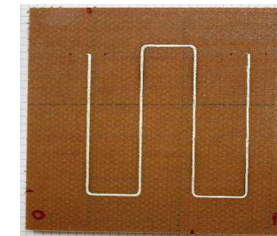
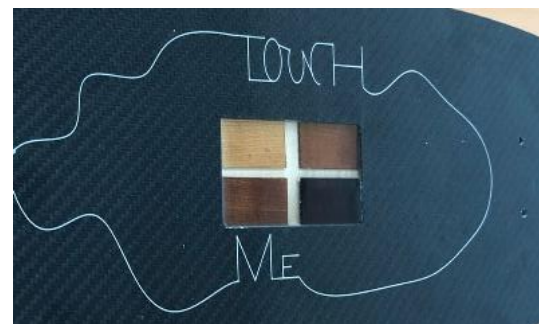
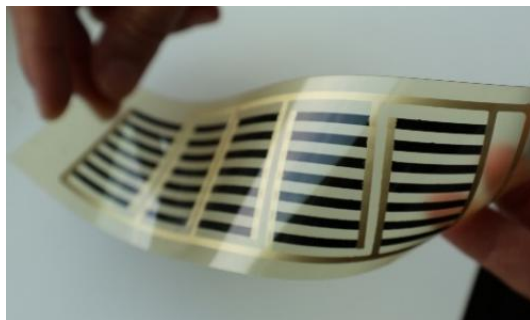
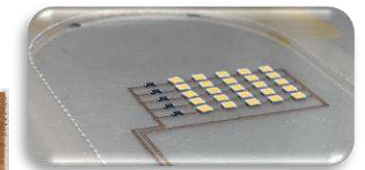
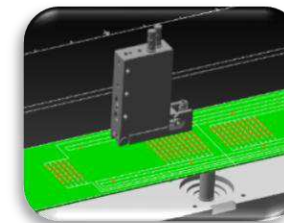
- Ofen
- IR
- Microwave
- ...



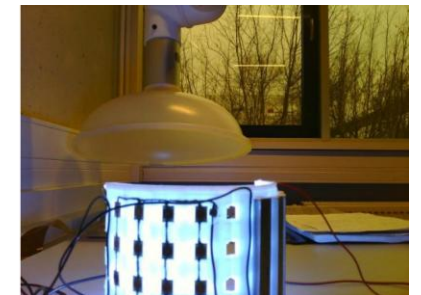
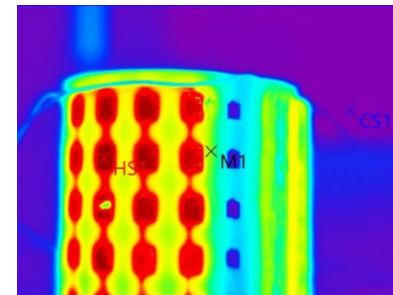
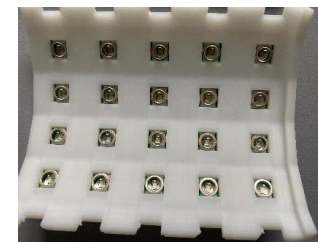
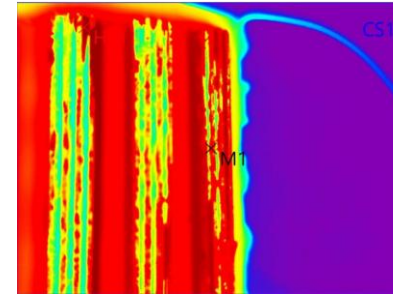
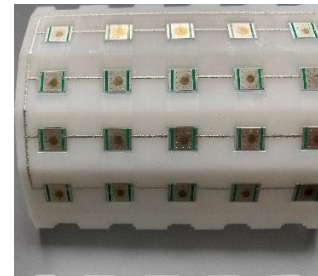
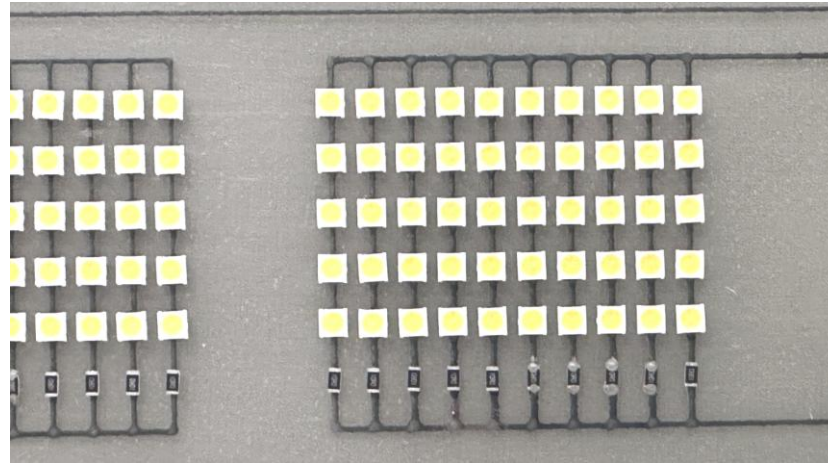
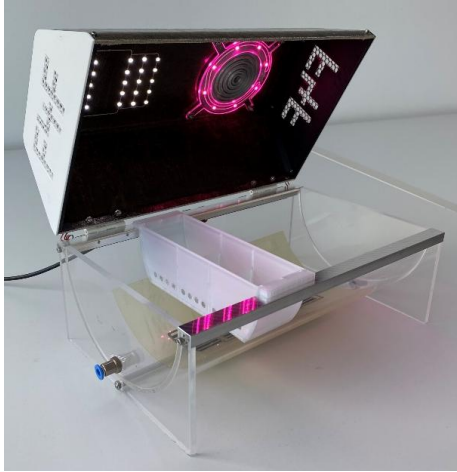
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M35
L_PARK
G04 0.5

(Block 2 - Contour 2D - block 2#)
TOOLID[3] (Change to PiezoJet)
L_TCHANGE
M37 (PiezoJet OFF)
G0 X-10. Y-8.
Z22.
M36 (PiezoJet ON)
G1 Y-13. F900
M37 (PiezoJet OFF)
G0 Y-15.
M36 (PiezoJet ON)
G1 Y-20.
M37 (PiezoJet OFF)
G0 X-15. Y-22.
M36 (PiezoJet ON)
G1 Y-27.
X-10.
Y-22.
M37 (PiezoJet OFF)
    
```



Anwendungsmöglichkeiten - Illumination



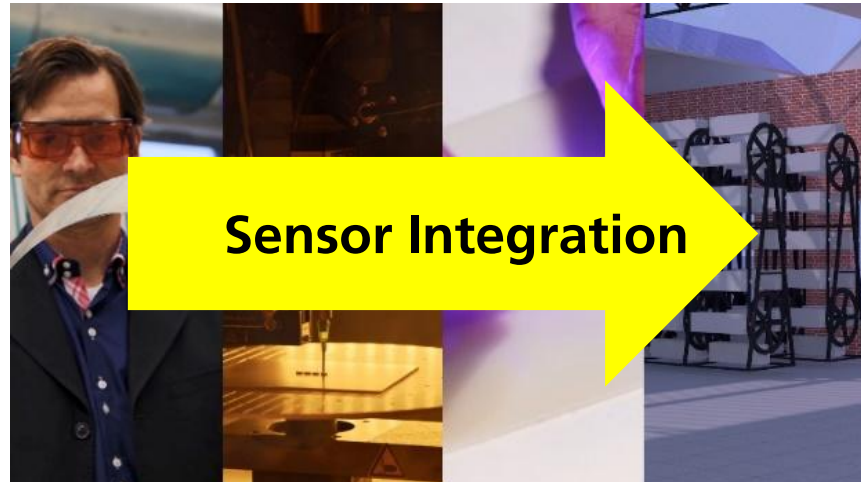
Anwendungsmöglichkeiten - Illumination

Makroalgenkultivierung unter Verwendung unterschiedlicher Wellenlängen zur Optimierung des Nährstoffgehalts

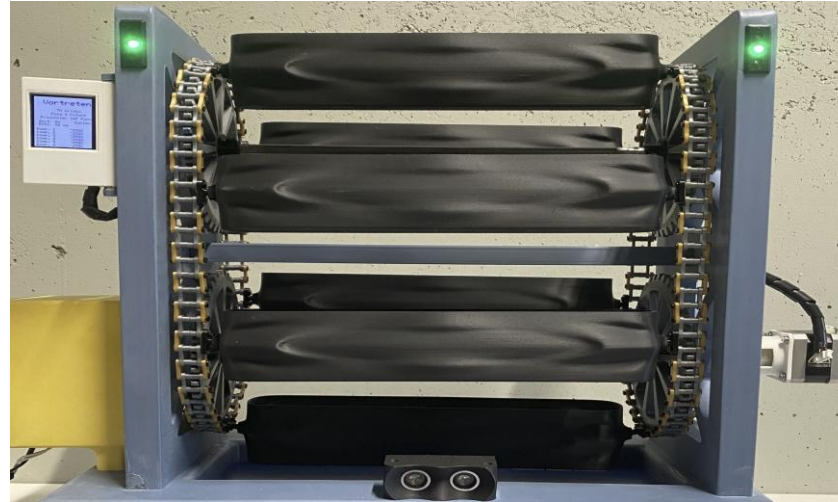


Foto: Rebecca Klopsch - IGZ

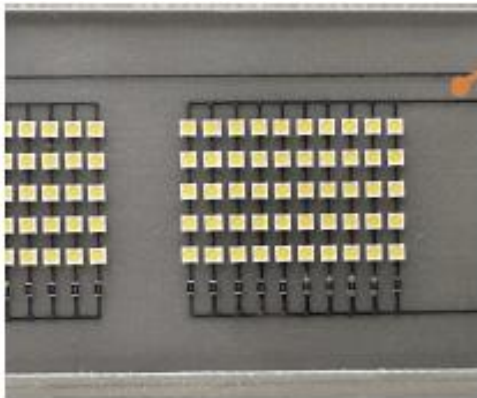
Nachhaltige Fertigungstechnologien für Kultivierungskompartimente im Vertical Farming Kontext – Food4Future



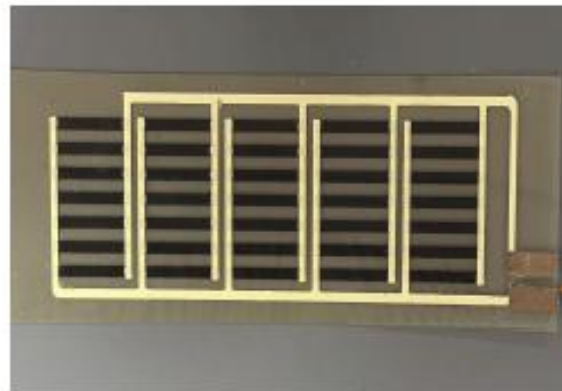
Nachhaltige Fertigungstechnologien für Kultivierungskompartimente im Vertical Farming Kontext – Food4Future



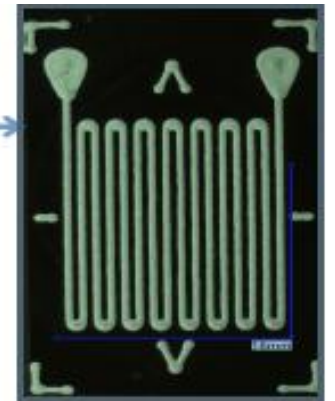
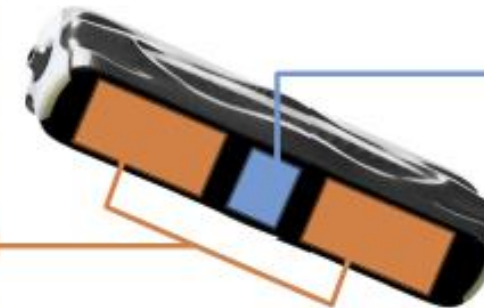
Modell-Paternoster



Beleuchtung

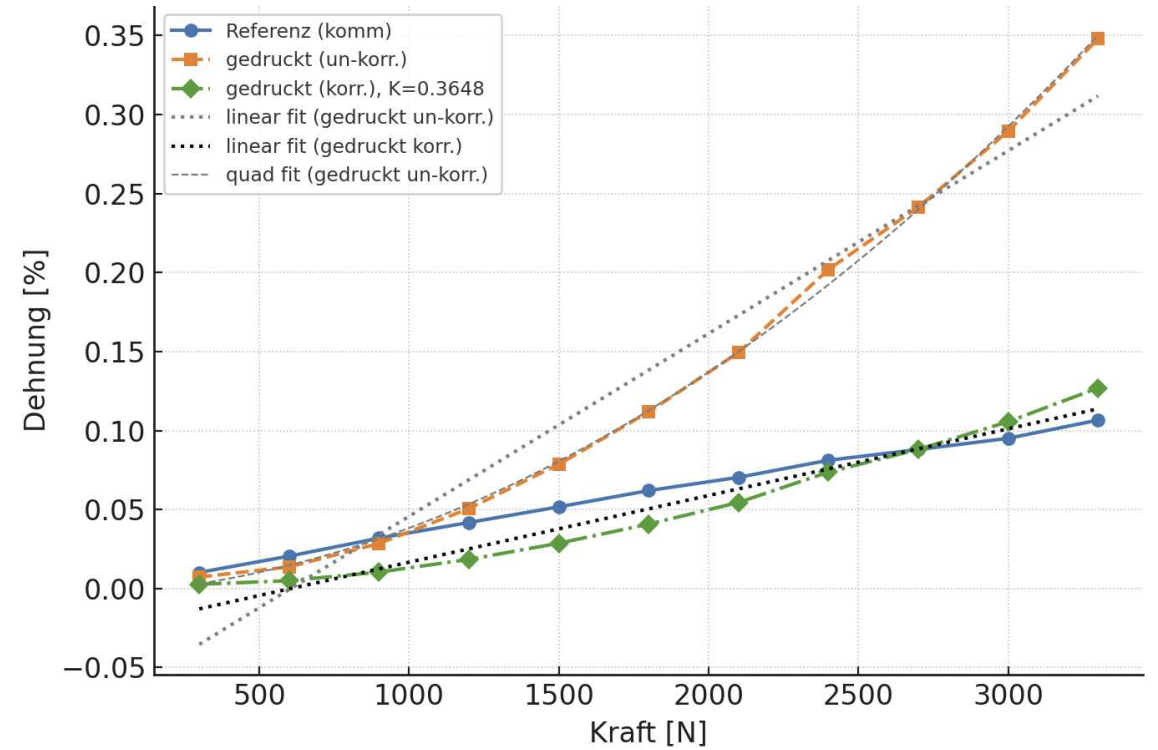
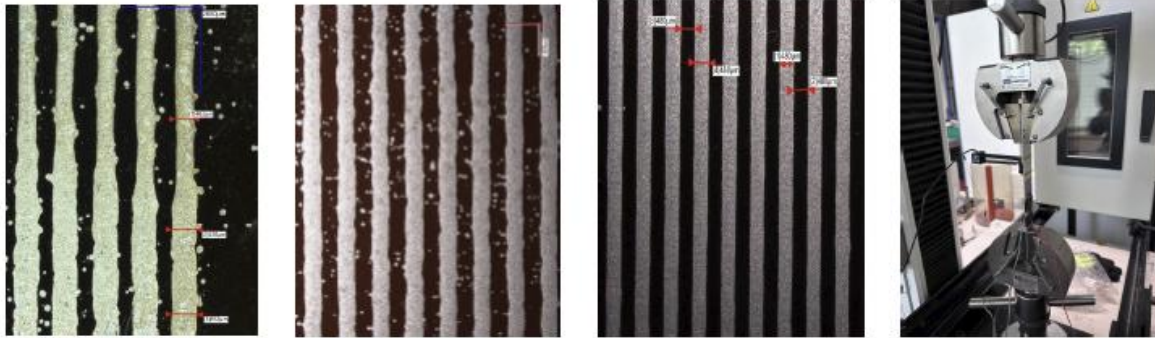


Heizung

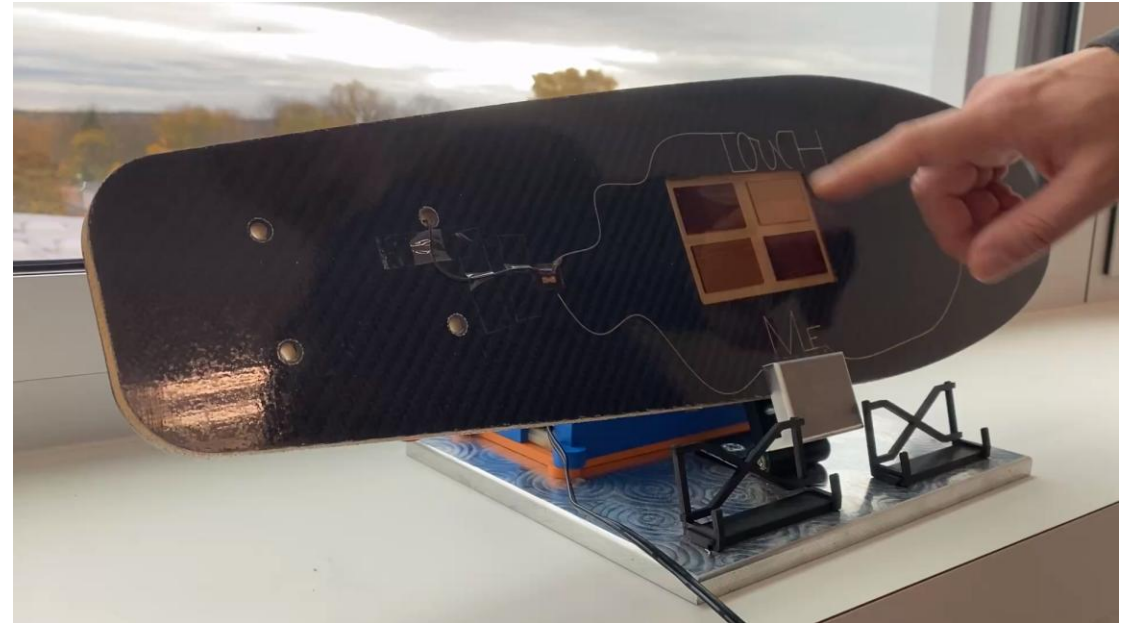


Dehnmessstreifen

Optimierungsprozess Dehnmessstreifen



Druck Kapazitiver Sensoren



Mikrowellensintern inkjet-gedruckter Leiterbahnen

Nutzung thermolabiler Substrate



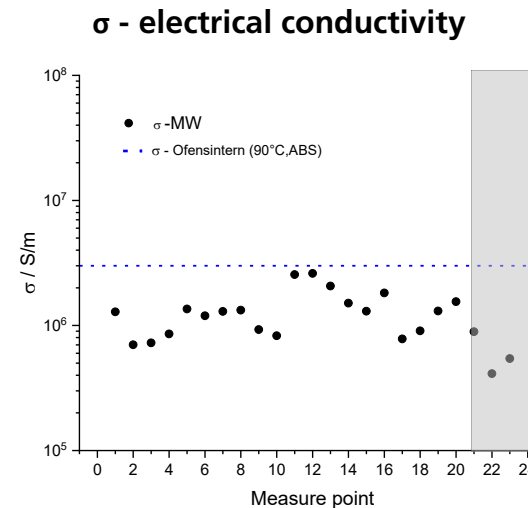
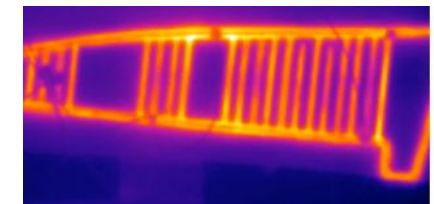
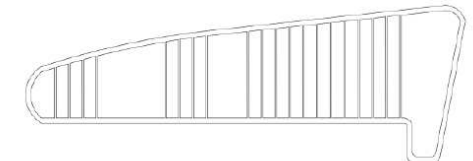
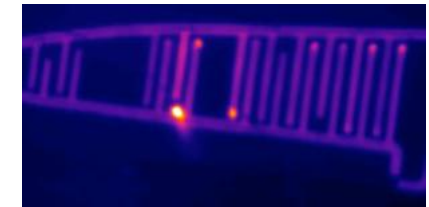
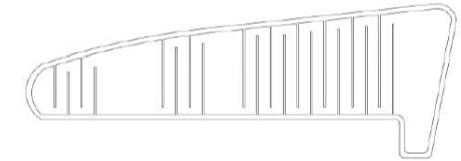
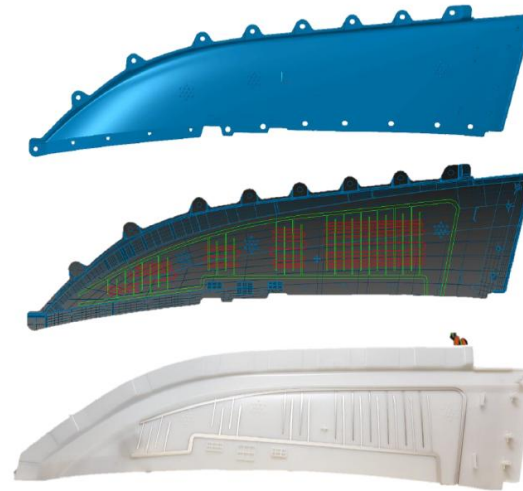
- l/ w/ h: 3 m/ 1,8 m/ 1,55 m
- 36 Magnetrons à 0,85 kW @ f=2,45 GHz
- Hexagonale Kammer
- Leistungseinstellung über Zeitmittelwert von $P=0$ und $P=P_{max}$
- Temperaturmessung:
 - IR-Kamera
 - Faser-optische Sensoren

Mikrowellensintern inkjet-gedruckter Leiterbahnen

Nutzung thermolabiler Substrate

Armlehne aus Acrylnitril-Butadien-Styrol-Copolymer (ABS)

- Thermische Eigenschaften ABS:
- Schmelzpunkt: 130 °C
- Max. Temperatur kurzzeitig: 120 °C
- Max. Temperatur dauerhaft: 80 °C
- Bedruckung: Linienhöhe $\approx 30 \mu\text{m}$
- Silbermikropartikelpaste
- Typische Sinterszeit 10 min bei 150 °C



Follow me on *Instagram* (prof.dreyer.th) 

and connect via *LinkedIn* (Christian Dreyer, Technische Hochschule Wildau) 



Thank you very much for your attention!

Prof. Dr. rer. nat. Christian Dreyer

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Chairman of the Faculty Council for Engineering and Natural Sciences

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