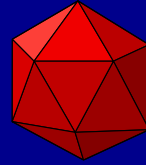


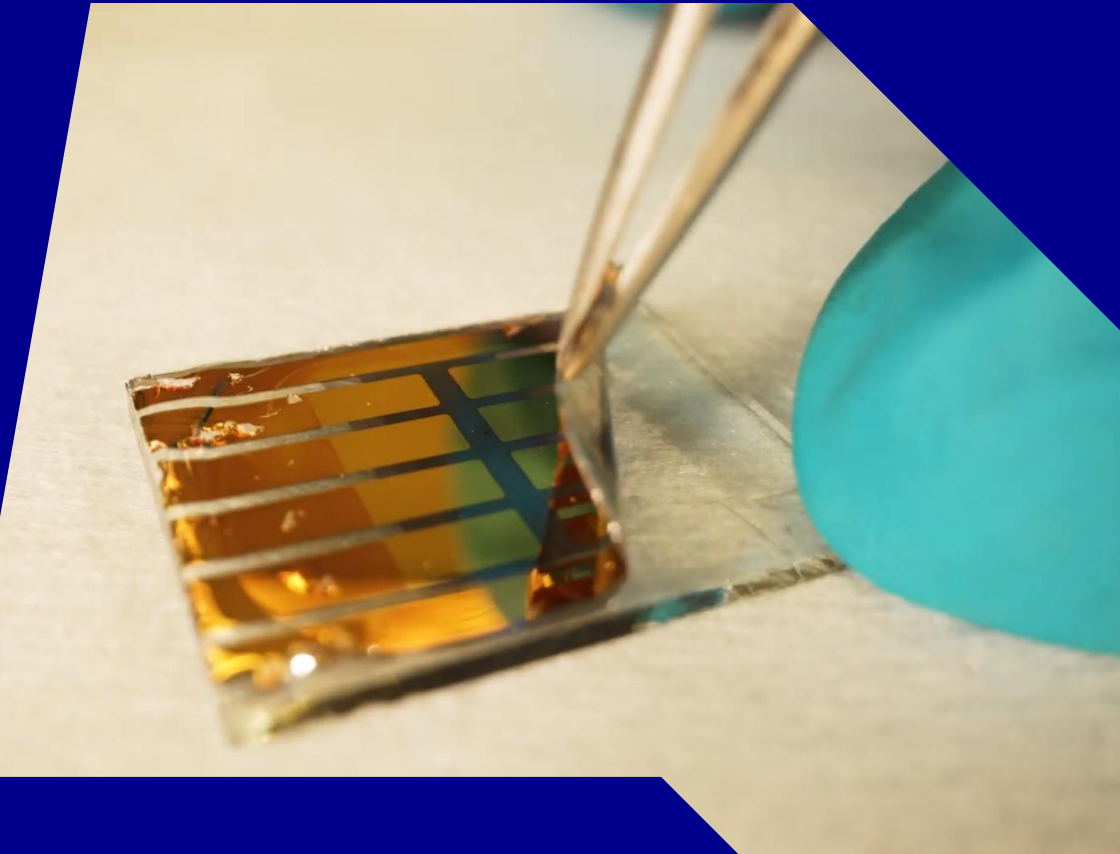


Technische
Universität
Dresden



Annual Report 2025

Institute of Solid-State Electronics



Annual Report 2025

This work is subject to copyright. All rights are reserved.

© Dresden University of Technology 2025

Online available at

<https://tu-dresden.de/ing/elektrotechnik/ife/das-institut/annual-reports>

Title image: Peeling off a flexible organic photodiode from its carrier substrate.

Publisher	Director of the Institute for Solid-State Electronics Prof. Dr. Caroline Murawski
Editor	Prof. Dr. Caroline Murawski, Heike Collasch
Layout and typesetting	Prof. Dr. Caroline Murawski, Dr. Ron Hildebrandt
Address	Institute of Solid-State Electronics TUD Dresden University of Technology 01062 Dresden Web: tu-dresden.de/ing/elektrotechnik/ife Mail: Heike.Collasch@tu-dresden.de
Editorial deadline	12/12/2025

Preface

Dear friends and partners of the Institute of Solid-State Electronics,

The famous author Hermann Hesse wrote in one of his poems: “In all beginnings dwells a magic force” (“Jedem Anfang wohnt ein Zauber inne”). With the recent start of Caroline Murawski as professor and director of IFE, the year 2025 has brought new beginnings for many of us.

On the International Women’s Day, we have starred in a **video** that **showcases** the work of **female professors at TU Dresden**.¹ In this, we gave insights into our research activities on organic semiconductor devices for biomedical applications and encouraged junior and especially female researchers to follow a career in academia.



Image from the “female professors at TU Dresden” video.

In June, Prof. Murawski gave a **university-wide inaugural lecture** entitled “Organic Semiconductors for a Brighter Future of Brain Research”. After welcoming speeches by the Rector Prof. Staudinger and our Dean Prof. Richter, she motivated the need for new devices and techniques to enable more precise neuronal stimulation. Compared to more traditional approaches based on optical fibers or classical semiconductors, the use of organic semiconducting materials makes it possible to achieve higher precision at improved biocompatibility. If we caught your interest, you may watch a recording of this lecture online.² In preparation of the talk, we had again a movie team visiting our labs and producing an “introducing” video. This movie focused more strongly onto our experimental work such as solution-processed organic photodiodes and the development of waterproof, flexible encapsulation of organic devices.³



Prof. Murawski gave her university-wide inaugural lecture. Left image (from left to right): Rector Prof. Staudinger, Vice-Rector Research Prof. Rösen-Wolff, Prof. Murawski, Prof. Leo, Dean Prof. Richter. Right: IFE group photo.

Besides all this media coverage, we also had again very fruitful research activities resulting in a large number of publications, seven PhD graduations, and presentation of our work on conferences across four different continents. Particularly successful were our former students **Dr. Robert Dauth** and **Sari Anschütz**, who got awarded for their thesis: Dr. Dauth received the **Prize for Measurement and Sensor Technology of the Gisela and Erwin Sick Foundation** for his dissertation “Inductively Coupled Coils Angle Encoders with Improved Performance and Linearity”. Our master student Sari Anschütz received the **master prize of the German Society for Biochemistry and Molecular Biology (GBM)** and the **young professionals prize of the Kurt Schwabe Association**, both for her master thesis entitled “A potential role of larval *Drosophila melanogaster* pheromones in feeding and aggression behavior”. Besides, we are very happy that **Dr. Sudhi Mahadevan** successfully applied for a competitive **Marie Skłodowska Curie postdoctoral fellowship** within the EU Horizon funding framework. Having pursued his PhD at City University of Hong Kong, Dr. Mahadevan joined the IFE in June to develop a flexible optical breath sensing patch based on organic semiconducting devices.



Awarding the GBM master prize to Sari Anschütz (second to the right) at Hochschule Mittweida.

In our **teaching activities**, Prof. Murawski started to contribute to the Bio-medical Engineering (BMT) Diploma course, for which she established a new

lecture on “Biomedical Imaging and Image Analysis” that is accompanied by a new lab course in which students learn techniques such as ultrasound imaging and computer tomography. In the related seminar, the students researched modern medical imaging techniques and presented their results in the form of a podcast. In future, we will further intensify our activities in the BMT degree, for example in the specialization “Biomedical Sensors and Actor Devices”. Besides our established lectures on “Plasma Technology” held by Prof. von Hauff and “Introduction to Sensorics” by Prof. Härtling, another new lecture on “Organic Semiconductor Optoelectronics” for students in Nanoelectronic Systems (NES) is currently held by Dr. Saggarr.

One of our longest members of the Institute, PD Dr. Helmut Budzier, retired after having worked at the Institute since 1986. Throughout his career, Dr.



Institute day out with a visit to Moritzburg Castle on 14 August 2025.

Budzier has led our research activities in the field of thermography and pyrometry, contributed to seven books and numerous scientific publications, taught thousands of students the basics of electrical engineering, and managed the IT of our Institute. We are grateful for his longstanding support and dedicated work. The IT management has been taken over by Dr. Ron Hildebrandt, who joined the Institute as new lab engineer and who now supports the technical activities of our scientists.

Besides our dedicated work on solid-state electronics, new sensor techniques, and thin-film materials, we also enjoyed time together outside our workplace. We

started last year's Christmas party more actively by doing archery and visiting Dresden's technical museum (Technische Sammlungen) before coming together at the Institute for mulled wine and international delicacies. During summer, on one of the hottest days of the year, we visited Moritzburg Castle and enjoyed refreshments in the shade of a nearby beer garden.

At the end of this year, all labs of Prof. Murawski will move to TUD. Unfortunately, the planned construction works in her new labs in Werner-Hartmann-Bau progress very slowly and the two new labs – an S1 biosafety lab for experimenting with fruit flies and a lab for fabrication of organic semiconductor devices – have not been finished yet. However, arrangements are in place to ensure that all group members are able to continue their experimental work. Thanks to all colleagues at TUD who made this possible!

The magic force of our beginnings is also reflected in the new design of our annual report, which itself follows TUD's renewed corporate design. Maybe you can feel this force as well when you flick through the pages. However, not all beginnings are successful right away, and sometimes support is required, especially if labs are not yet in place. We are grateful to everyone who contributed to our activities during the last year – the Faculty of Electrical and Computer Engineering, the university board and administration, and of course all our scientific and industry partners. Finally, we want to thank our team members for their hard work and great contributions to last year's success!



Prof. Dr. Caroline Murawski



Prof. Dr. Elizabeth von Hauff



Prof. Dr. Gerald Gerlach



Prof. Dr. Thomas Härtling

1 <https://youtu.be/vZz7dPf9jwU?si=12RGlzvE96UIeSRv>

2 <https://youtu.be/vAz8gvdJZ9g?si=6feUU5mjTcg0-hk1>

3 https://youtu.be/JflrxF_H1N0?si=v1y1N68-ixy7SKB7

Content

Preface.....	3
Content.....	7
Staff.....	9
Scientific Reports.....	11
Teaching.....	27
Awards.....	28
Graduations.....	29
Publications.....	31
Conference Contributions.....	37

Staff

Professors

Prof. Dr. Caroline Murawski (Institute Director)

Prof. Dr. Elizabeth von Hauff

Prof. Dr. Gerald Gerlach

Prof. Dr. Thomas Härtling

Secretariat

Heike Collasch

Technical Staff

Sabine Herbst

Dr. Ron Hildebrandt

Ulrike Lehmann

Christian Ullmann

Academic Staff

Dr. Shaimaa Abdalbaqi

PD Dr. Helmut Budzier

Dr. Alejandra Maria Castro Chong

Dr. Agnes Eydam

PD Dr. Margarita Günther

Dr. Sudhi Mahadevan

Dr. Siddhartha Saggarr

Dr. Jens Weber

Dr. Agnė Žukauskaitė

PhD Candidates

Carola Böhmer

Ajisha C.

Rabiul Islam

Markus Koenigsdorff

Hans Liebscher

Simon Letzer

Nirbhika Nandakumar

Junhao Ni

Gregor Uhlig

Students

Alexandre Ansieau

Sari Anschütz (WHK)

Lara John (WHK)

Associated

Dr. Gunnar Suchaneck

Scientific Reports

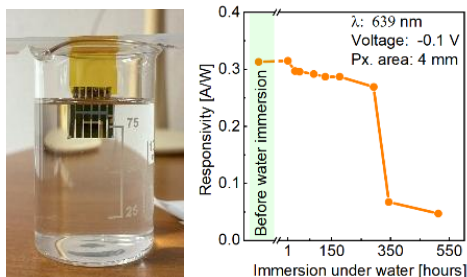
Ultra-flexible, machine-washable organic photodiodes based on hybrid encapsulation

Rabiul Islam, Siddhartha Saggar, Caroline Murawski

Organic photodiodes (OPDs) show strong potential for biomedical use due to their flexibility and biocompatibility, but they require robust protection against moisture. We investigated flexible OPDs incorporating a 7 nm silver electrode deposited on a PEIE seed layer, which maintains stable sheet resistance after 10,000 bending cycles at a 1.5 mm radius.

The devices use a PM6:PC₇₁BM active layer on a parylene-C/ALD-assisted Al₂O₃/ZrO₂ multilayer nanolaminate substrate, with identical encapsulation on top. The flexible OPDs achieve a responsivity of 0.26 A/W at -0.1 V under 639 nm illumination, comparable to glass-based reference OPDs. The OPDs retain 86 % of their initial responsivity after 12 days in deionized water and remain functional after machine washing, demonstrating their suitability for durable use in aqueous environments.

We also investigated organic filters using a 2 μm -thick rubrene: P3HT layer that blocks wavelengths below ≈ 600 nm while transmitting red light. When combined with broadband OPDs, this filter enabled highly red-selective devices with a bichromatic responsivity ratio of up to 66,000:1 for red-to-green light.^[1] Such red-selective OPDs were applied in our lab for fluorescence detection of biological samples.



Flexible OPDs immersed in deionized water (left). Responsivity of flexible OPDs after prolonged water submersion (right).

PI	Prof. Dr. Caroline Murawski
Project	Organic Electronics for Optogenetic Stimulation and Detection of Neuronal Signals (NeuroLichtOrgEl)
Duration	11/2021– 10/2026
Funder	Ministry of Research, Technology and Space, 13XP5239

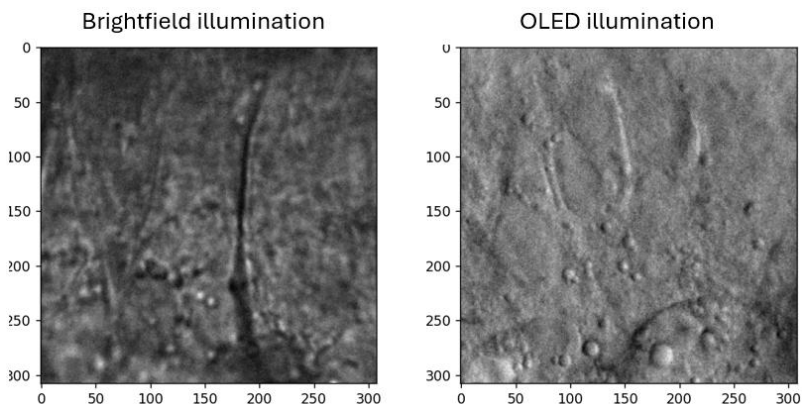
Microscopy contrast enhancement using OLEDs

Jens P. Weber, Ajisha C., Simon Letzer, Sudhi Mahadevan, Caroline Murawski

Standard live-cell microscopy typically relies on contrast enhancement techniques such as Phase Contrast, DIC, or Dodt Contrast to visualize (sub-) cellular structures. However, these established methods require specialized objectives with modified optical elements (Phase Contrast, DIC) or incorporate costly and cumbersome auxiliary hardware that occupies valuable space on the microscope platform (Dodt Contrast).

To overcome these limitations, we have developed novel organic light-emitting diodes (OLEDs) engineered with unique emission properties. These properties alter the interaction between specimen and light, enhancing contrast under standard brightfield microscopy conditions.

This innovative illumination strategy significantly improves the visibility of fine cellular features without requiring complex optical modifications or additional hardware. Consequently, it enables advanced physiological experiments such as patch-clamp recordings that necessitate high-contrast visualization of subcellular components under native brightfield illumination.



Comparison of brightfield illumination and OLED illumination of a *Drosophila* larval brain.

PI	Prof. Dr. Caroline Murawski
Project	Organic Electronics for Optogenetic Stimulation and Detection of Neuronal Signals (NeuroLichtOrgEI)
Duration	11/2021– 10/2026
Funder	Ministry of Research, Technology and Space, 13XP5239

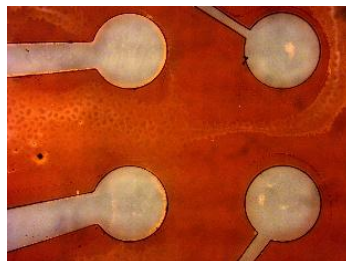
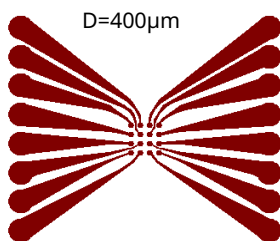
Photolithography of organic devices

Shaimaa M. Abdalbaqi, Caroline Murawski

This work aims to integrate organic light-emitting diodes (OLEDs) and organic photodiodes (OPDs) on flexible substrates with pixel sizes down to 10 μm . We designed a photomask and investigated photolithography processes for patterning metallic electrodes and organic layers.

Glass substrates were coated with a negative resist, exposed through a 365 nm UV mask, and developed. Metal or organic layers were deposited, and the resist lifted off to reveal the final structures. The main challenge is to find photolithographic processes that are compatible with organic semiconductor materials. Two negative photoresists were used: (1) AZ nLOF 2020, and (2) fluorinated Rf-Calix-tBoc with photoacid generator (PAG)^[1,2]. Different solvents were investigated to lift off the photoresists without affecting metal and organic layers. Hydrofluoroethers (HFE), which are environmentally friendly, have previously demonstrated high compatibility with organic materials^[1,2]. While metals could be successfully lifted off and compatibility of HFE solvents with OPD materials could be found, more work is required to achieve photolithographic patterning of the entire OPDs.

Eventually, patterned OPDs will be deposited on flexible substrates and combined with OLEDs for simultaneous optogenetic excitation and fluorescence imaging from neurons.



Photolithographic mask for patterning OPD pixels (left) and developed photoresist layer (right).

[1] S. Krotkus *et al. Adv. Opt. Mater.* 2, 1043 (2014)

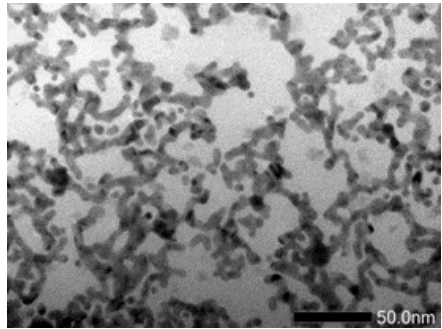
[2] A.A. Zakhidov *et al. Chem. Sci.* 2, 1178 (2011)

PI	Prof. Dr. Caroline Murawski
Project	Organic Electronics for Optogenetic Stimulation and Detection of Neuronal Signals (NeuroLichtOrgEI)
Duration	11/2021– 10/2026
Funder	Ministry of Research, Technology and Space, 13XP5239

2D metallic aerogels and organic LEDs for biomedical applications

Nirbhika Nandakumar, Alexandre Ansieau, Lara John, Caroline Murawski

2D gold nanoparticle aerogels were evaluated as transparent electrodes for organic light-emitting diodes (OLEDs). We investigated the synthesis of surfactant-free gold nanoparticles (AuNPs) under various conditions. Two regimes were identified, producing either a stable, monodisperse or an unstable, polydisperse NP solution. Phase-boundary gelation enabled the formation of 2D metallic aerogel networks from the AuNPs, where continuous networks yielded aerogels with sheet resistances in the $k\Omega/\square$ range, whereas structural discontinuities led to $M\Omega/\square$ values.



TEM image of aerogel network with sheet resistance of $3 k\Omega/\square$.

The electrodes shall be incorporated on flexible substrates, for which a low water vapor transmission rate (WVTR) is crucial to ensure robust encapsulation of organic optoelectronic devices. In order to investigate the WVTR, we are currently setting up a custom measurement system based on the calcium corrosion method.

Eventually, we designed flexible OLEDs for new biomedical applications such as an optogenetic cochlear implant. For this, OLEDs were designed to achieve high optical power density and good overlap of the emission spectrum with the absorption spectrum of light-sensitive proteins. Optical microcavity simulations were performed for forward-directed emission, ensuring targeted neural activation. Based on these results, a layout for an OLED-based implant was developed.

PI	Prof. Dr. Caroline Murawski	
Project	Organic Electronics for Optogenetic Stimulation and Detection of Neuronal Signals (NeuroLichtOrgEl)	Research Training Group 2767: Supracolloidal Structures, Project B5
Duration	11/2021 – 10/2026	04/2022 – 09/2026
Funder	Ministry of Research, Technology and Space, 13XP5239	German Research Foundation (DFG, 451785257)

Infrared nanocrystal LEDs for biomedical sensing

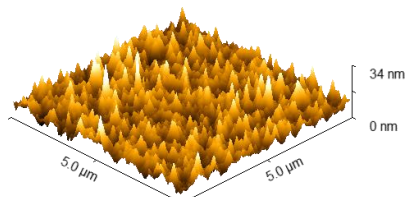
Simon Letzer, Caroline Murawski

The near-infrared (NIR) biological window (650–1350 nm) is ideal for sensing due to high tissue penetration, enabling deep-tissue imaging and health monitoring. Wearable devices must be flexible and long-lasting, but while organic LEDs meet these requirements in the visible range, their efficiency drops sharply above 850 nm. Nanocrystal LEDs can fill this gap, though most high-efficiency devices use cadmium, which is unsuitable for biomedical applications. This project focuses on integrating RoHS-compliant nanocrystals into LEDs emitting in the biological window to create flexible, durable devices for biomedical sensing.

The nanocrystals are synthesized by a collaborator within the project, Andrey Iodchik, Chair of Physical Chemistry. To establish a baseline, we started with known CdHgSe/CdZnS core/shell nanocrystals to optimize fabrication methods and understand the fundamental behavior of nanocrystal LEDs. Later, we will focus on CuInS₂/ZnS and CuFeS/ZnS.

The devices can be fully fabricated using solution processing techniques such as spin coating. Film quality is highly sensitive to solution concentration, solvent selection, dispense time, spin profile, and baking conditions. Compared to polymer layers, solution processing of nanocrystals is more challenging due to their tendency to aggregate. For CdHgSe/CdZnS nanocrystals, using high-boiling-point solvents produced uniform films at macroscopic scale, while low baking temperatures combined with high final spin speeds enhanced microscopic smoothness.

To characterize the devices, an optical setup was built for J–V–L and electroluminescence measurements, covering a spectral range from 400 to 1700 nm.



AFM measurement of a CdHgSe/CdZnS layer reveals a low RMS roughness: of 3 ± 0.5 nm.

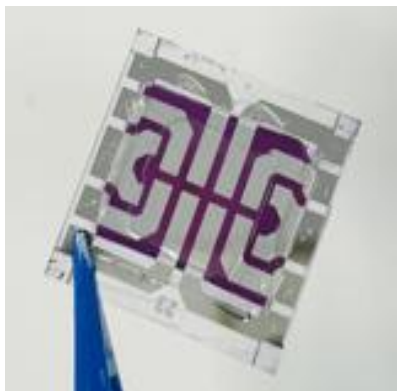
PI	Prof. Dr. Caroline Murawski
Project	Research Training Group 2767: Supracolloidal Structures Project B12
Duration	04/2022 – 09/2026
Funder	German Research Foundation (DFG, 451785257)

Developing near-infrared organic photodiodes for breath monitoring

Sudhi Mahadevan, Siddhartha Saggar, Rabiul Islam, Caroline Murawski

For clinical diagnosis of various diseases, breath analysis has become a powerful non-invasive tool, which demands the development of reliable and efficient sensing technologies. However, conventional respiratory monitors hinder users' mobility, provide discomfort, and affect natural breathing patterns.^[1,2] To implement an ultra-thin, sticker-type optical breath sensor, organic light-emitting diodes (OLED) will be used to emit light to the chest and an integrated organic photodetector (OPD) to record optical changes of diffusely scattered light in the skin while breathing.

As a first step, we fabricated high-performance near-infrared (NIR) OPDs using a PM6:Y6 blend—combining a polymer donor with an NIR-absorbing small molecule—processed from the green solvent o-xylene. The electrodes were deposited by thermal evaporation. In this simplified device architecture, the hole-blocking functionality is incorporated directly into the active layer, reducing fabrication complexity and enabling cost-effective production. We will next integrate these OPDs with NIR OLEDs and develop sensor arrays equipped with dedicated readout circuitry for breath-monitoring applications.



Photograph of fabricated near-infrared organic photodiode.

[1] M. Chu et al., *npj Digital Medicine* **2**, 8 (2019).

[2] T. Hussain et al., *Sensors* **23**, 7518 (2023).

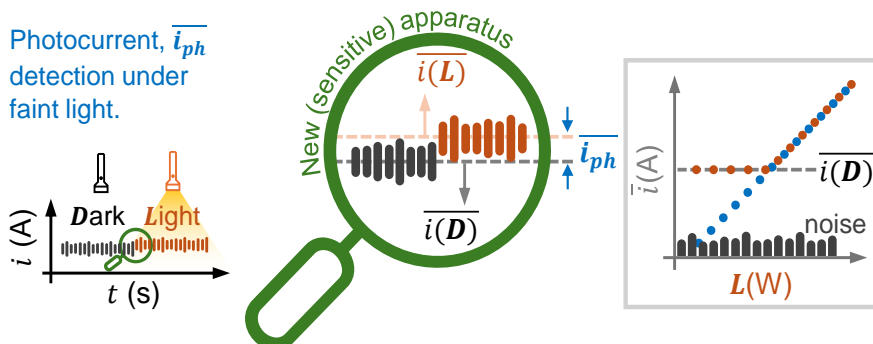
PI	Prof. Dr. Caroline Murawski
Project	BreathS – Flexible Optical Breath Sensing Patch
Duration	06/2025 – 05/2027
Funder	Marie Skłodowska-Curie Actions (MSCA) Individual Fellowship (101210090)

Benchmarking organic photodiodes near noise floor

Siddhartha Saggar, Caroline Murawski

This work pertains to organic photodiodes (OPDs) – considered the next-generation technology for light sensors. A challenge remains to reliably test these sensors at very low illuminations, close to its noise level. Furthermore, investigations on OPD dark noise remain minimal, owing to technical constraints and lack of standardized approaches to report them. To address this, we developed a sophisticated ultra-low-noise apparatus,^[1] with open-source Python scripts to automate the experimentations.^[2] With each of its component well-calibrated, the apparatus can accurately tune incident optical power over 12 decades down to femtowatts and record OPD current with femtoampere sensitivity. A unique measurement framework is introduced, involving time-dependent current measurement under dark condition, followed by continuous-wave faint illumination, facilitating reliable extraction of photocurrent ($\overline{i_{ph}}$) near the noise floor. The proposed approach challenges the standard noise analysis paradigm in OPDs by integrating time-domain and frequency-domain noise characterizations within a unified methodology—unique to OPD research. It enables reliable measurement of key photodetecting metrics such as dark current, dark noise, detectivity and linear dynamic range.

Photocurrent, $\overline{i_{ph}}$
detection under
faint light.



Illustrative representation of the new measurement framework being employed to reliably decipher photocurrent, dark current, dark noise and linear dynamic range of organic photodiodes.

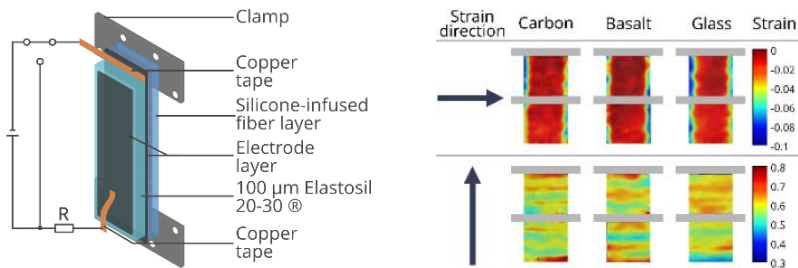
PI	Prof. Dr. Caroline Murawski
Project	Benchmarking organic photodiode at the noise floor
Duration	09/2022 – 06/2025
Funder	Institutional Funds, Erasmus+ Traineeship, EU Horizon (101008701)

Influence of fiber material on actuation and sensing in fiber-reinforced DEAs

Carola Böhmer, Gerald Gerlach

Dielectric elastomer actuators (DEAs) have numerous appealing characteristics, such as rapid actuation speeds and a wide range of possible configurations. These characteristics have made DEAs a major focus in the field of soft robotics. A DEA consists of a thin elastomer membrane sandwiched between two compliant electrodes, which deform under high voltage. Strip-shaped DEAs combined with a passive fiber reinforcement layer exhibit mechanically anisotropic behavior. These fiber-reinforced DEAs (FRDEAs) can generate actuation forces independent of their aspect ratio. Their deformation is restricted to a single degree of freedom, which maximizes uniaxial deformation and simplifies control.

The mechanical and electro-mechanical behavior of FRDEAs is influenced by different fiber reinforcement materials, depending on their conductivity and fiber-matrix adhesion. Glass, basalt, and carbon fibers were investigated for DEA reinforcement layers and compared. Non-conductive fibers exhibited higher stiffness due to thicker fiber-silicone layers and more misoriented fibers, as observed via digital image correlation. Although the samples were stiffer, all actuators exhibited active strain under a high voltage of 5 kV. When the electrode adjacent to the fiber layer is used for sensing, non-conductive fibers are preferable because conductive fibers introduce noise and complexity to the signal while non-conductive fibers show low signal drift and less decrease of gauge factor due to the Mullins effect.



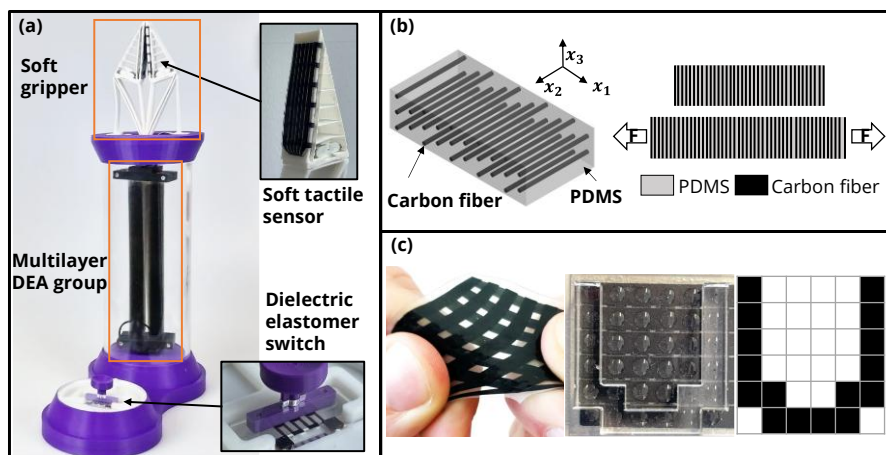
Left: Sample structure and materials used. Right: Digital image correlation results for all actuator variants.

PI	Prof. Dr. Gerald Gerlach
Project	Research Training Group 2430, project 8
Duration	11/2018 – 10/2027
Funder	German Research Foundation, GRK 2430 (380321452)

Dielectric elastomer devices and soft tactile sensor

Junhao Ni, Gerald Gerlach

This research focuses on the design and fabrication of dielectric elastomer devices. We submitted three manuscripts this year covering soft robotics system, materials, and tactile sensors. The first work integrates dielectric elastomer actuation, switching, and tactile sensing into a fully soft gripper platform, demonstrating closed-loop control using only soft functional units (Fig. (a)). The second one introduces a carbon fiber elastomer film that provides strong mechanical anisotropy for thin soft electronic systems, improving strain control and enhancing both actuator performance and sensor precision (Fig. (b)). The third one presents an entirely soft, stretchable tactile switch array that achieves robust binary contact detection with material costs below one dollar per sensor (Fig. (c)).



(a) Gripper system with fully soft functional units enabled by dielectric elastomers, (b) carbon fiber elastomer film for mechanically anisotropic enhancement of stretchable electronics, and (c) low-cost and environment-tolerant stretchable matrix tactile switch sensor array.

PI	Prof. Dr. Gerald Gerlach
Project	Research Training Group 2430, project 7
Partner	TU Dresden, ITM and IHM
Duration	11/2024 – 10/2027
Funder	German Research Foundation, GRK 2430 (380321452)

Detection of biomolecules with supramolecular hydrogels

Margarita Günther, Gerald Gerlach

Photo cross-linked copolymers of dimethyl acrylamide (DMAAm) and vinyl dimethyl azlactone (VDMA) with incorporated supramolecular host/guest structures (Table) were used in biosensors to detect biomarkers like spermine (SP), spermidine (SD), spermine tetrahydrochloride (SP4HCl), and lysophosphatidic acid (LPA) as well as for the neurotransmitter dopamine (DP), for a hepatotoxic agent adiponitrile (AN), and for a pesticide paraquat (PQ). Such sensors are of great interest for applications, e. g., in medicine, non-invasive medical diagnostics and care, pharmacy, and environmental protection.

The type of interactions that develop between host and guest in such supramolecular hydrogel systems are purely physical and non-covalent, and therefore reversible. The hydrogel swelling was measured using piezoresistive pressure sensor elements with a thin bending plate (Figure). These sensors were designed with respect to high sensitivity, fast response and good long-term stability in the concentration range of 1-10 μM . Both the limit of detection as well as the cross-sensitivity to relevant interferents in typical physiological concentration ranges were studied.^[1]

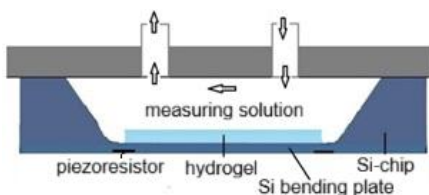
Used host/guest structures

Host	Guest	Analyte
Pillar[5]arene	THA ¹	SP, SD, SP4HCl
	TAHA ²	PQ
	MIHA ³	DP, AN
β -Cyclodextrin	Ferrocene	LPA

¹Triazolyl hexylamine (THA)

²N1,N1,N1-trimethylhexane-1,6-diaminium dichloride (TAHA)

³Methyl imidazolium hexylamine (MIHA)



Design of a hydrogel-based piezoresistive sensor.

[1] M. Rodin, M. Guenther, G. Gerlach, D. Kuckling, *ACS Appl. Mater. Interfaces*, 2025

PI	Prof. Dr. Gerald Gerlach, Prof. Dr. Dirk Kuckling
Project	Dually cross-linked supramolecular hydrogels for sensor applications
Partner	University Paderborn, Department Chemistry
Duration	05/2022 – 08/2026
Funder	German Research Foundation (DFG, 501220359: GE 779/47-1)

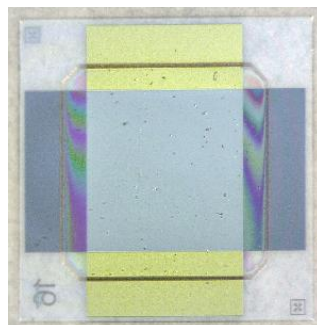
Ultra-thin lithium tantalate chips with absorption layer for highly sensitive pyroelectric infrared sensors

Agnes Eydam, Gerald Gerlach

Pyroelectric infrared sensors made of lithium tantalate (LiTaO_3) are widely used radiation sensors. Certain areas of application, such as the detection of very low gas concentrations in environmental and process measurement technology, require increasingly sensitive detectors. The goal of this work is therefore to develop pyroelectric sensors with an extremely high signal-to-noise ratio.

The reproducible manufacturing of ultra-thin LiTaO_3 chips is a challenge due to the limited plane parallelism of the starting wafers. The thickness differences across a (22 x 22) mm² wafer were between 1 μm and 2.3 μm . The pyroelectric chips were thinned down in several steps to 1 μm by ion beam etching (IBE) with a slow etching rate of (20 ... 25) nm/min. Thinner chips that had already reached the desired final thickness were manually coated with photoresist. The figure shows a LiTaO_3 chip with a 20 μm thick carrier frame and a 1.6 μm thin sensitive element.

To ensure high and spectrally uniform sensitivity of the sensors in the wavelength range of (2 ... 14) μm , an aluminum (Al) absorption layer is applied to the sensitive element. This is achieved by glancing angle deposition (GLAD), whereby the layer is deposited at a very high angle of incidence while the substrate is rotating. The layers were applied at angles between 60° and 85° with thicknesses of (1 ... 2) μm . Al is well suited for this purpose due to its low volume-related specific heat capacity of 2.4 J/cm³K.



Self-supporting LiTaO_3 chip with a 1.6 μm thin sensitive element.

PI	Dr. Agnes Eydam, Prof. Dr. Gerald Gerlach
Project	Joint project: Highly sensitive pyroelectric infrared sensors and their application in gas analysis (PyroGas) Subproject: Fundamentals of ultra-thin lithium tantalate chips for pyroelectric sensors
Partner	DIAS Infrared GmbH (Dresden), Dr. Födisch Umweltmesstechnik AG (Markranstädt)
Duration	11/2024 – 04/2027
Funder	SAB joint project (EFRE technology funding), ID: 100729222

Textile-integrated flexible thermal actuators for temperature rendering in smart wearables

Gregor Uhlig, Elizabeth von Hauff

This project aims to develop a fast and lightweight temperature rendering actuator with high activation speeds for compact smart wearables, based on electrocaloric (EC) polymer composites which can be integrated into textile-based actuator arrays.

By embedding these components in a highly flexible matrix, new piezoelectric polymer composites will be developed into thermal actuators for wearable applications and affective touch rendering. The underlying polymer matrices were examined comparatively and suitable material systems were determined. All matrices have been adjusted for high performance photo-initiated 3D-printing processes.

Efficient organic, inorganic and mixed EC-composite-materials have been investigated. Further multimodal analyses will establish structure-property relationships essential for reliable EC performance. The demonstrated composite matrices will be integrated into existing, well-established spinning and weaving processes.



Example of a microscopic image of a thermoactive polymer composite fiber integrated into a textile yarn.

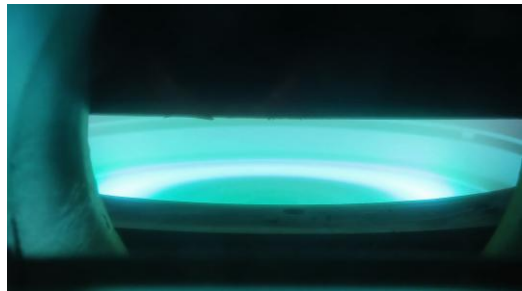
PI	Prof. Dr. Elizabeth von Hauff
Project	Textile-integrated flexible thermal actuators for temperature rendering in smart wearables
Partner	Institute of Textile Machinery and High Performance Material Technology (ITM)
Duration	Since 12/2023
Funder	Centre for Tactile Internet with Human-in-the-Loop (CeTI) -Cluster of Excellence-

Reactive multitarget magnetron sputtering and magnetron sputter epitaxy

Christian Andreas Ullmann, Agne Žukauskaitė, Elizabeth von Hauff

Reactive multitarget magnetron sputter technology and magnetron sputter epitaxy (MSE) are used for the fabrication of high quality thin films of various materials. The sputtering tool LS730s (von Ardenne GmbH) allows us to deposit thin films on up to four 150 mm diameter substrates at a time in RF, DC, and pulsed DC sputtering modes using heater temperatures of 650 °C. Argon and oxygen are used as process gasses and an installation for nitrogen supply is planned for 2026. The multitarget configuration offers several advantages, including the ability to deposit mixed and stacked films of various metals and oxides in a single deposition run, improving process efficiency and repeatability. In addition, the tool is equipped with plasma emission monitoring (PEM)^[1] to support the stability of reactive sputter mode. By using this technique, reactive gas flow into the system is continuously adjusted based on the measured intensity of a specific emission line of one of the sputtered species. PEM technology allows coating uniformity and stability with time.

For our most recent third-party and in-house research projects, we developed platinum, titanium oxide and other complex oxide coatings from ceramic targets and processes for magnesium oxide coatings in collaboration with the Institute of Aerospace Engineering.



View of magnesium sputtering in an argon atmosphere at 600 W.

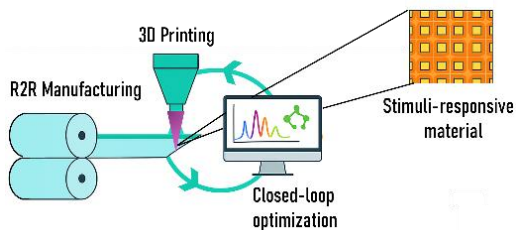
[1] Dannenberg et al., *Thin Solid Films*. 360, 122 (2000).

PI	Dr. Agne Žukauskaitė, Prof. Dr. Elizabeth von Hauff
Project	Third-party funded projects and TUD in-house research
Partner	Fraunhofer Institute for Electron Beam and Plasma Technology FEP & TU Dresden
Duration	Long-term cooperation
Funder	Third-party and institutional funds

Next-generation process engineering for R2R printing of 4D stimuli-responsive microstructures

Alejandra Castro Chong, Gregor Uhlig, Elizabeth von Hauff

The project aims to develop a roll-to-roll volumetric additive manufacturing (R2R-VAM) process for the continuous, high-throughput fabrication of 4D stimuli-responsive microstructures on flexible substrates. By integrating advanced digital light processing-based 3D printing with scalable roll-to-roll production and closed-loop autonomous optimization, the approach enables rapid manufacturing with fine resolution over large areas. This is based in our proof-of-concept, demonstrating the rapid 3D printing of microstructured piezoelectric polymeric films.^[1] This technology is expected to bridge the gap between laboratory-scale demonstrations and industrial fabrication of adaptive materials. A key focus is on piezoelectric polymers, particularly polyvinylidene fluoride (PVDF) and its derivatives, chosen for their low cost, stability, biocompatibility, and flexibility. In our recently submitted review *"Ferroelectric Properties of Polyvinylidene Fluoride (PVDF): Advances and Prospects for Emerging Applications"*, we critically assess PVDF as a compelling candidate for advancing next-generation technologies.^[2] The project will demonstrate how fast, scalable fabrication of flexible, responsive microstructures can enable new products such as soft microgrippers and other complex microscale devices.



Scheme of the manufacturing process engineering of 4D stimuli-responsive microstructures via R2R, light processing-based 3D printing with autonomous optimization.

[1] J. Frick et al., *Adv. Mat. Techn.* 9, 2301469 (2024). doi: 10.1002/admt.202301469

[2] A. Frick et al., *J. of Macromolecular Chem. And Phys.*, submitted (2025)

PI	Prof. Dr. Elizabeth von Hauff
Project	Flexible and Scalable Printing of 4D Stimuli-Responsive Microstructures
Partner	Fraunhofer Institute for Electron Beam and Plasma Technology (FEP)
Duration	since 05/2025
Funder	Institutional funds

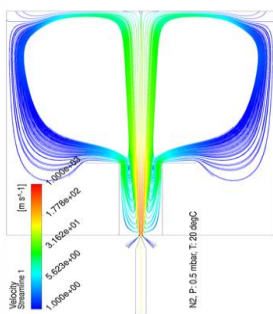
Electron beam hybrid discharges for chemical conversion processes

David J. Schreuder, Elizabeth von Hauff

Electron beam hybrid discharges (EBHD) are investigated for promoting chemical conversion processes in discharges. For example, the dissociation of CO_2 in plasmas enables a synthesis route for CO production, which is a valuable component of Fischer-Tropsch synthesis. In the EBHD, the electric field over the plasma can be tuned independent of the electron ionization. This enables energy input in vibrational modes, and potentially offers an energy-efficient dissociation pathway of CO_2 .^[1]

Plasma chemical conversion is experimentally investigated at the Fraunhofer Institute for Plasma Technology (FEP). The test stand consists of an electron beam source ($U_b = 25$ kV, $I_b = 3$ mA, $\varnothing \approx 1$ mm) connected to a higher pressure ($p = 0.5$ mbar) via a differential pumping stage. CO_2 enters the reaction chamber through a conical nozzle resulting in a supersonic gas jet. The EB-excited plasma jet is demonstrated in the Figure via a photograph from the laboratory as well as computational fluid dynamics (CFD) performed by the project partner Fraunhofer Institute for Applied Mathematics (Kaiserslautern). Current focus is to combine these results to optimize the chemical conversion, as well as evaluation of local plasma effects.

[1] Bogaerts, A., Snoeckx, R.; *Chem. Soc. Rev.*, **46**, 19 (2017)



Left: Photograph of an electron beam ionized gas discharge.

Right: CFD simulations of gas flow pattern.

PI	Prof. Dr. Elizabeth von Hauff
Project	Electron Beam Hybrid Discharges for chemical conversion processes
Partner	Boysen-TU Dresden Research Training Group, Fraunhofer FEP, Fraunhofer ITWM
Duration	03/2022 – 08/2026
Funder	Friedrich-Elisabeth Boysen Stiftung

Teaching

Summer semester 2025

Introduction to Sensorics (Sensorik I)

Thomas Härtling, Margarita Günther, Jens P. Weber

Lecture, seminar, lab course (2/1/1)

Medical Imaging and Image Analysis (Medizinische Bildgebung und -verarbeitung)

Caroline Murawski, Hagen Malberg

Lecture, seminar, lab course (2/1/1)

Winter semester 2025/2026

Plasma Technology

Elizabeth von Hauff, Agnė Žukauskaitė, David Schreuder, Alejandra Castro-Chong

Lecture, seminar (4/2/0)

Organic Semiconductors for Optoelectronics

Siddhartha Saggari, Caroline Murawski

Lecture, seminar (2/1/0)

BeING Inside

Gerald Gerlach, Daniel Knöfel

Project (5 days + presentation)

Awards

Robert Dauth

Prize for Measurement and Sensor Technology of the Gisela and Erwin Sick Foundation for his dissertation "Inductively Coupled Coils Angle Encoders with Improved Performance and Linearity"

16.05.2025

Sari Anschütz

Master prize of the German Society for Biochemistry and Molecular Biology (GBM)

23.06.2025

Sari Anschütz

Young professionals prize of the Kurt Schwabe Association for her Master thesis

30.06.2025

Sukhrob Abdulazhanov

Best paper award at the 50th IEEE European Solid-State Electronics Research Conference (ESSERC 2024) for the paper [Abdulazhanov, S., Le, Q.H., Lehninger, D., Sünbül, A., Kämpfe, T., & Gerlach, G.: "BEoL varactors based on HfO₂/ZrO₂ superlattice for mmWave applications"]

11.09.2025

Graduations

Dr. Markus Koenigsdorff

„Dielektrische Elastomeraktoren für unidirektionale Bewegungen“

24.03.2025

Supervisor: Prof. Dr. G. Gerlach

Dissertation

Dr. Sebastian König

„Korrektur der Ungleichförmigkeit von Infrarotkameras mittels der Datenreferenzmethode“

24.03.2025

Supervisor: Prof. Dr. G. Gerlach

Dissertation

Dr. Simon Oster

„Eignung thermografischer in-situ-Prozessbeobachtung zur Vorhersage lokaler Porosität mittels maschinellen Lernens im pulverbettbasierten Schmelzen von Metall“

10.09.2025

Supervisor: Prof. Dr. G. Gerlach

Dissertation

Dr. Ron Hildebrandt

„Vibrational Coupling Mechanisms in $\text{CuBr}_x\text{I}_{1-x}$ Investigated by Raman Spectroscopy“

18.09.2025

Universität Leipzig, Arbeitsgruppe Halbleiterphysik

Supervisor: Prof. Dr. M. Grundmann

Dissertation

Dr. Darshankumar Bhat

„A Data Driven Prognostics and Health Monitoring Framework for Electronics“

29.10.2025

Supervisor: Prof. Dr. T. Härtling

Dissertation

Dr. Caroline Schwinge

„CMOS-kompatible Dünnschichten für integrierte thermoelektrische Bauelemente“

03.11.2025

Supervisor: Prof. Dr. G. Gerlach

Dissertation

<p>Dr. Guoxiu Zhang <i>"Doping and Defect Engineering in Zinc Oxide Thin Films"</i> 11.12.2025 Supervisor: Prof. Dr. E. von Hauff</p>	<p>Dissertation</p>
<p>Joyappa Paradana Somaiah <i>"Investigation of the strain-dependent complex impedance of conductive elastomers filled with carbon particles with a focus on the matrix material"</i> 06.03.2025 Supervisor: Prof. Dr. G. Gerlach</p>	<p>Master's Thesis</p>
<p>Datta Sai Kalangi <i>"Comparative evaluation of flip chip bonding with and without tin-silver cap on copper pillars"</i> 20.03.2025 Supervisor: Prof. Dr. E. von Hauff</p>	<p>Master's Thesis</p>
<p>Lucy Winkler <i>"Towards Developing a Fluorescence Sensor using an OLED as Light Source and an OPD for Detection"</i> 24.04.2025 Supervisor: Prof. Dr. C. Murawski</p>	<p>Master's Thesis</p>
<p>Alexandre Ansieu <i>"Formation of Au aerogels as transparent electrodes"</i> 18.09.2025 Supervisor: Prof. Dr. C. Murawski</p>	<p>Master's Thesis</p>
<p>Lynda Mansouri <i>"Sputter deposition of piezoelectric and ferroelectric AlScN thin films with high Sc content for applications in wireless, optical, and quantum communication"</i> 13.10.2025 Supervisor: Prof. Dr. E. von Hauff</p>	<p>Master's Thesis</p>

Publications

D. Bhat, S. Münch, M. Röllig, T. Härtling: Machine learning-based prediction of remaining useful lifetime for solder joints based on real mission profile data. *Technisches Messen* **92**, 56 – 61 (2025).

DOI: [10.1515/teme-2025-0056](https://doi.org/10.1515/teme-2025-0056)

Paper

S. Hasanefendic *et al.*: Sustainable energy experiments and demonstrations: Reviewing research, market and societal trends. *Energy Research & Social Science* **122**, 104018 (2025).

DOI: [10.1016/j.erss.2025.104018](https://doi.org/10.1016/j.erss.2025.104018)

Paper

E. von Hauff: Continuing the diversity conversation. *Nature Photonics* **19**, 337 (2025).

DOI: [10.1038/s41566-025-01647-8](https://doi.org/10.1038/s41566-025-01647-8)

Paper

M. Koenigsdorff, S. Konstantinidi, A. Endesfelder, P. Osipov, J. Mersch, E.-F. M. Vorrath, M. Zimmermann, Y. Perriard, G. Gerlach: Elimination of necking and aspect ratio dependence in uniaxial actuators by continuous fiber reinforcement. *Advanced Robotics Research*, 202500010 (2025).

DOI: [10.1002/adrr.202500010](https://doi.org/10.1002/adrr.202500010).

Paper

S. Konstantinidi, M. Koenigsdorff, P.-J. Martin, A. Benouhiba, Y. Civet, G. Gerlach, Y. Perriard: Advanced Materials Technolo: DEyeA: Artificial muscles for the restoration of eye blinking following facial paralysis. *Advanced Materials Technologies* **10**, 2401616 (2025).

DOI: [10.1002/admt.202401616](https://doi.org/10.1002/admt.202401616)

Paper

S. Konstantinidi, M. Koenigsdorff, A.O. Salazar, A. Benouhiba, T. Martinez, Y. Civet, G. Gerlach, Y. Perriard: Towards artificial muscle implants: structured reinforcement of dielectric elastomers. *Smart Materials and Structures* **34**, 055006 (2025).

DOI: [10.1088/1361-665X/adcf64](https://doi.org/10.1088/1361-665X/adcf64)

Paper

- S. Kuntz, A. Fränznick, N. Oppel, G. Gerlach, S. Fella: Measurement setup for characterization of inductive rotary position sensors. *Technisches Messen* **92**, 111–116 (2025).
DOI: [10.1515/teme-2025-0080](https://doi.org/10.1515/teme-2025-0080)
- H. Liebscher, J. Nirmala Suresh, M. Tahir, J. Mersch, S. Wießner, C. Cherif, G. Gerlach: Viscoelastic strain response of dielectric elastomer materials for artificial muscles. *Materials Research Express* **12**, 115701 (2025).
DOI: [10.1088/2053-1591/ae1796](https://doi.org/10.1088/2053-1591/ae1796)
- J. Nirmala Suresh, H. Liebscher, H. Komber, M. Tahir, G. Gerlach, S. Wießner: Effects of polymeric crosslinker on network structure, morphology and properties of liquid isoprene rubber. *Polymers* **17**, 551 (2025).
DOI: [10.3390/polym17040551](https://doi.org/10.3390/polym17040551)
- L. Schaap, T. Teichmann, A. Poremba, S. Schopf, S. Heicke, A. Mayer, T. Müller, G. Mattausch, E. von Hauff: Degradation of micropollutants in wastewater by hybrid treatment with low-energy electrons and ozone. *Journal of Radioanalytical and Nuclear Chemistry*, 2025.
DOI: [10.1007/s10967-025-10559-4](https://doi.org/10.1007/s10967-025-10559-4)
- P. Schlenz, C. Steiner, O. Zywitzki, E. von Hauff: Highly transparent aluminum silicon oxy nitride permeation barriers for optoelectronic devices. *Surface & Coatings Technology* **512**, 132411 (2025).
DOI: [10.1016/j.surfcoat.2025.132411](https://doi.org/10.1016/j.surfcoat.2025.132411)
- Y. Shi, S. Schreiber, G. Gerlach, T. Wallmersperger: Poromechanical modeling of a stimuli-responsive hydrogel in a chemical sensor with force compensation. *Journal of Intelligent Material Systems and Structures* (accepted, 2025).
- L. Surner, L. Chen, B. Bendjus, G. Gerlach: Optimizing defect detection in connections of power electronics by laser speckle photometry. *Technisches Messen* **92**, 152–158 (2025).
DOI: [10.1515/teme-2025-0006](https://doi.org/10.1515/teme-2025-0006)

- Q. Thong Trinh, N. Quang Dich, V. Phuong Trieu, G. Gerlach: Combined opto-impedimetric whole-cell biosensors for environmental applications. *Journal of Measurement, Control, and Automation* **29** (accepted, 2025). **Paper**
- T. Tulus, V. M. Friebe, A. Peukert, L. A. Muscarella, M. R. Jones, R. N. Frese, E. von Hauff: Purple bacteria reaction center based solid state bio-solar cell with a large open circuit voltage. *ChemPhotoChem* **9**, e202400303 (2025). **Paper**
DOI: [10.1002/cptc.202400303](https://doi.org/10.1002/cptc.202400303)
- S. Yang, F. Müller, Y. Raffel, N. Yadav, R. Hoffmann, F. Schöne, D. Lehninger, T. Kämpfe, K. Seidel, H. Mulaosmanovic, D. Kleimaier, S. Dünkel, S. Beyer, M. Lederer, G. Gerlach: Temperature-dependent detrapping behavior of p-/n-type ferroelectric FETs with Si/SiGe channel. *IEEE Electron Device Letters* **46**, 2269 (2025), DOI: [10.1109/LED.2025.3625193](https://doi.org/10.1109/LED.2025.3625193). **Paper**
- W. Xu et al.: Unveiling the Role of Guanidinium for Enhanced Charge Extraction in Inverted Perovskite Solar Cells. *ACS Energy Letters* **10**, 2660-2669 (2025). **Paper**
DOI: [10.1021/acsenergylett.5c00469](https://doi.org/10.1021/acsenergylett.5c00469)
- S. Kuntz, G. Gerlach, S. Fella: Inductive position sensors based on coupling of coils on printed circuit boards for demanding automotive applications. In: *Symposium Elektromagnetismus. Künzelsau 2025. TAE Tagungshandbuch*. 53-58 (2025). **Preprint**
<http://arxiv.org/pdf/2503.14627>
- S. Yang, D. Lehninger, P. Reinig, F. Schöne, R. Hoffmann, K. Seidel, M. Lederer, G. Gerlach: Enhanced performance of FeFET gate stack via heterogeneously co-doped ferroelectric HfO₂ films (2025). **Preprint**
<http://arxiv.org/abs/2508.16768>
- C.H. Böhmer, M. Koenigsdorff, J. Paradanda Somaiah, J. Mersch, G. Gerlach: Influence of solvent on the piezoresistive properties of carbon-particle-filled elastomers. *Proceedings of SPIE* **13431**, 1343110 (2025). **Proceedings**
DOI: [10.1117/12.3051256](https://doi.org/10.1117/12.3051256)

- C.H. Böhmer, M. Koenigsdorff, J. Paradanda Somaiah, J. Mersch, G. Gerlach, (2025). Influence of solvent on the piezoresistive properties of carbon particle-filled elastomers. *In: EuroEAP 2025, 13th International Conference on Soft Transducers and Electromechanically Active Polymers, Linz, Austria*, 10.-12.06.2025. **Proceedings**
- J. Böttcher, C.H. Böhmer, A. Endesfelder, C.D. Wildemann, G. Gerlach, M. Zimmermann: Schadensmechanismen und deren Entwicklung bis zum Versagen von faserverstärkten DEAs: kombinierte in-situ Thermografie mit DIC. *In: Tagung Werkstoffprüfung 2025, Dresden*, 27.-28.11.2025 (2025). **Proceedings**
- S. Konstantinidi, M. Koenigsdorff, S. Holzer, Y. Civet, G. Gerlach, Y. Perriard: Contractile dielectric elastomer actuators with embedded active and passive structured fibers. *Proceedings of SPIE* **13431**, 134310N (2025). **Proceedings**
DOI: [10.1117/12.3051367](https://doi.org/10.1117/12.3051367)
- R. Islam, S. Saggarr, C. Murawski: Red-light-selective organic photodiodes via optical and material tuning for implantable sensors. *Proceedings of SPIE* **13590**, 135900P (2025). **Proceedings**
DOI: [10.1117/12.3076625](https://doi.org/10.1117/12.3076625), Open access: <https://nbn-resolving.de/urn:nbn:de:bsz:14-qucosa2-1002797>
- H. Liebscher, M. Koenigsdorff, C. Böhmer, J. Mersch, G. Gerlach: Investigation of local strains in circular dielectric elastomer actuators. *Proceedings of SPIE* **13431**, 1343112 (2025). **Proceedings**
DOI: [10.1117/12.3051366](https://doi.org/10.1117/12.3051366)
- J. Ni, A. Richter, G. Gerlach, E.-F. M. Henke: Robust, low-cost and stretchable matrix tactile sensor array with antighosting capabilities. *Proceedings of SPIE* **13431**, 1343111 (2025). **Proceedings**
DOI: [10.1117/12.3051340](https://doi.org/10.1117/12.3051340)

- D. J. Schreuder, E. von Hauff: Low-pressure Electron Beam-ionized gas discharge for plasma catalytic conversion processes. *International Workshop on Plasma, Catalysis and Thin Films for Conversion Processes (EFDS)*, (2025). **Proceedings**
- S. Abdulzhanov: Design, Integration and Characterization of CMOS-compatible RF Varactors Based on Ferroelectric HfO₂ Thin Films. *Dresdner Beiträge zur Sensorik*, Band 95. TUDpress (2025). **Book**
ISBN: 978-3-95908-823-7
- R.A. Dauth: Inductively Coupled Coils Angle encoders with Improved Performance and Linearity. *Dresdner Beiträge zur Sensorik*, Band 93. TUDpress (2025). **Book**
ISBN: 978-3-95908-751-3
- F. Müller: Charakterisierung ferroelektrischer Feldefekttransistoren und Anwendung in Speicherfeldern für In-Memory-Computing. *Dresdner Beiträge zur Sensorik*, Band 94, TUDpress (2025). **Book**
ISBN: 978-3-95908-810-7
- S. Oster: Eignung thermografischer in-situ-Prozessbeobachtung zur Vorhersage lokaler Porosität mittels maschinellen Lernens im pulverbettbasierten Schmelzen von Metall. *Dresdner Beiträge zur Sensorik*, Band 97. TUDpress (2025). **Book**
ISBN: 978-3-95908-829-9
- M. Stöhr: Entwicklung und Analyse von spannungsoptischen Methoden zur Absolutspannungsmessung in anisotropen Halbleitermaterialien. *Dresdner Beiträge zur Sensorik*, Band 91. TUDpress (2025). **Book**
ISBN: 978-3-95908-808-4
- K.S. Drese, G. Gerlach, P. Krause, C.T. Simmons. (2025). Global Overview. Chapter 1 in: *Engineering our Future: Sensor Trends 2030*. AMA Association for Sensors and Measurement in co-operation with VDI 2025. 5-18. **Scientific Study**

Conference Contributions

- C. H. Böhmer, M. Koenigsdorff, J. Paradanda Somaiah, J. Mersch, G. Gerlach: Influence of solvent on the piezoresistive properties of carbonparticle-filled elastomers. SPIE Smart Structures + Nondestructive Evaluation, Vancouver, Canada, 18.03.2025. **Talk**
- C. Murawski: Interfacing the brain with organic semiconductor devices. ISINA-Tagung, Chemnitz, 02.-03.04.2025. **Invited Talk**
- C. Murawski: Bright Ideas: Organic Optoelectronics for Bioimaging and Optogenetics. Symposium: From Classical to Quantum Measurement Systems – event of IQ. Dresden, 04.04.2025. **Invited Talk**
- J. Koerner, S. Wang, G. Gerlach: Controlled electronic properties, microstructure and degradation stability of MXene by integration into a 3D porous PNIPAAm hydrogel-based composite. 2025 MRS Spring Meeting & Exhibit, Seattle, USA, 07.-11.04.2025. **Talk**
- C. Murawski: Interfacing the brain with organic semiconductor devices. Optics & Photonics Day 2025, University College Dublin, Dublin, Ireland, 24.05.2025. **Invited Talk**
- C. Murawski: Organische Elektronik für Optogenetik und Fluoreszenz-Bildgebung. 671. Elektrotechnisches Kolloquium des VDE, Dresden, 28.05.2025. **Invited Talk**
- C. H. Böhmer, M. Koenigsdorff, J. Paradanda Somaiah, J. Mersch, G. Gerlach: Influence of solvent on the piezoresistive properties of carbonparticle-filled elastomers. EuroEAP 2025, Linz, Austria, 10.-12.06.2025. **Talk**
- J. Ni, M. Koenigsdorff, E.-F. M. Vorrath, A. Richter, G. Gerlach: Carbon fiber-silicone prepreg for anisotropic reinforcement of dielectric elastomer components. EuroEAP 2025, Linz, Austria, 10.-12.06.2025. **Talk**

- C. H. Böhmer, M. Koenigsdorff, J. Ni, J. Böttcher, G. Gerlach, M. Zimmermann: Influence of Fiber Material on Actuation Performance in Fiber-Reinforced DEAs. AUTEX 2025, Dresden, 13.06.2025. **Talk**
- J. Ni, M. Koenigsdorff, A. Richter, E.-F. M. Vorrath, G. Gerlach: Carbon fiber-constrained multilayer dielectric elastomer actuator fabricated via the sheet-to-sheet method. AUTEX 2025, Dresden, 13.06.2025. **Talk**
- C. Murawski: Biomedical optoelectronic sensors based on organic semiconductor technology. OASIS International Summer School on Sensor Technologies for Water and Health Applications, online, 16.-19.06.2025. **Invited Talk**
- C. Murawski: Organic semiconductors for a brighter future of brain research. University-wide inaugural lecture, Dresden, 19.06.2025. **Invited Talk**
<https://www.youtube.com/watch?v=vAz8gvdJZ9g>.
- R. Islam, S. Saggar, C. Murawski: Red-light-selective organic photodiodes via optical and material tuning for implantable sensors. SPIE Optics and Photonics, San Diego, USA, 03.-07.08.2025. **Poster**
 DOI: [10.1117/12.3076625](https://doi.org/10.1117/12.3076625)
- C. Murawski, Ajisha C., R. Islam, S. Saggar, J. P. Weber: Organic LEDs and photodetectors for fluorescence microscopy. SPIE Optics and Photonics, San Diego, USA, 03.-07.08.2025. **Invited Talk**
 DOI: [10.1117/12.3064532](https://doi.org/10.1117/12.3064532)
- D. Bhat, S. Muench, M. Kaeso, M. Roellig, C. Tschoepe, T. Haertling: Prognostics and Health Monitoring: Case Study of a Light Rail Vehicle Power Converter Assembly. 25th European Microelectronics & Packaging Conference, Grenoble, France, 16.-18.09.2025. **Invited Talk**
- D. Bhat, S. Muench, M. Roellig, T. Härtling: Machine Learning-based Damage Prediction Model for Solder Joints using Mission Profile, XXXIX. Messtechnisches Symposium, Chemnitz, 17.-18.09.2025. **Talk**

R. Islam, S. Saggar, C. Murawski: Flexible, Mechanically Durable, and Machine-Washable Organic Photodiodes Based on Hybrid Encapsulation. ECME, Cambridge, UK, 22.-26.09.2025. **Talk**

C. Murawski, R. Islam, S. Saggar, G. Ciccone, Ajisha C., J. P. Weber: Flexible, waterproof organic photodetectors and LEDs for optogenetics and fluorescence imaging. AMIO, Brisbane, Australia, 08.-10.12.2025. **Invited Keynote Talk**

C. Murawski, R. Islam, S. Saggar, G. Ciccone, Ajisha C., J. P. Weber: Flexible, waterproof organic photodetectors and LEDs for optogenetics and fluorescence imaging, Kyung Hee University, Seoul, Korea, 12.12.2025. **Invited Talk**

Member of

DRESDEN
concept



Contact

TU Dresden
01062 Dresden

› tu-dresden.de

Digital version:



More information:

<https://tu-dresden.de/ing/elektrotechnik/ife>