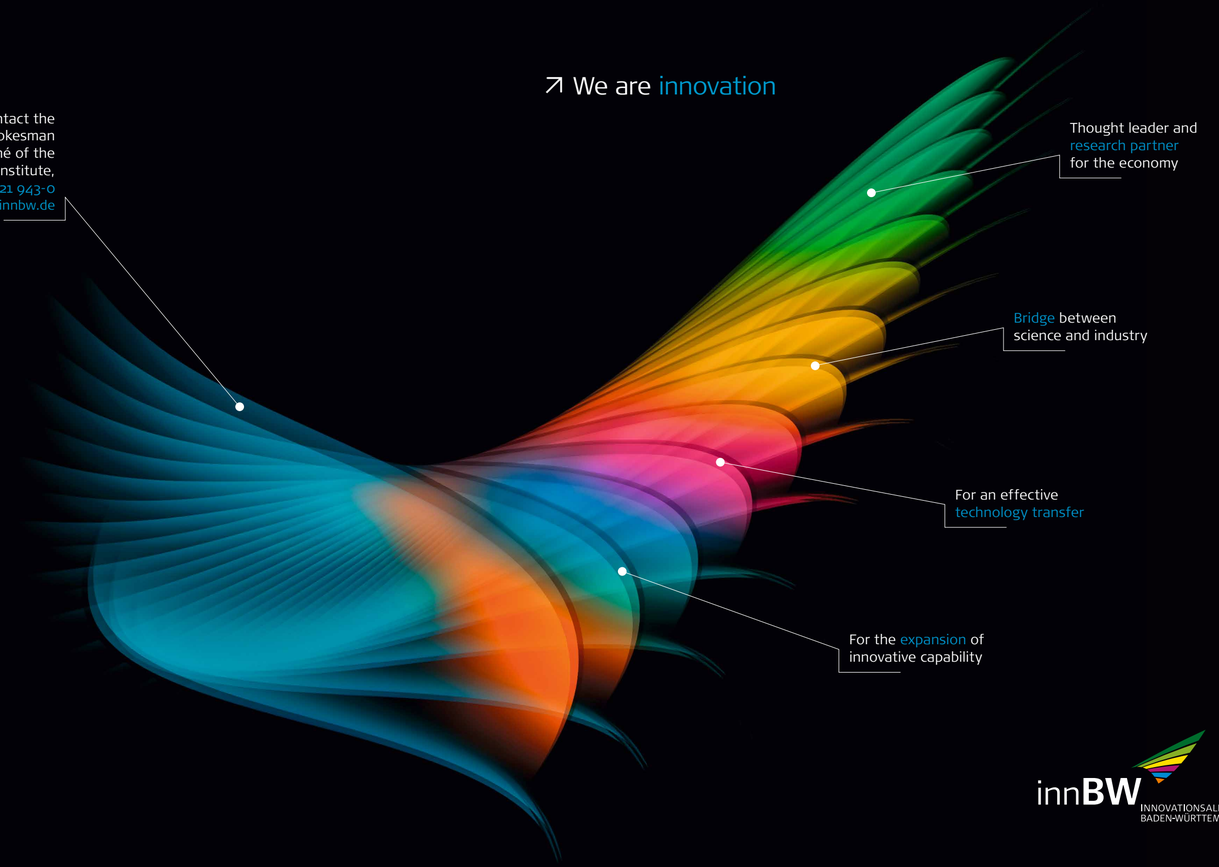
↗ We are innovation

If you have any questions please contact the individual institutions directly or the spokesman of the alliance, Prof. Prof. Dr. Alfons Dehé of the NMI Natural and Medical Sciences Institute, by telephone at +49 07721 943-0 or by e-mail at alfons.dehe@innbw.de



Thought leader and research partner for the economy

Bridge between science and industry

For an effective technology transfer

For the expansion of innovative capability

innBW INNOVATIONSALLIANZ BADEN-WÜRTTEMBERG

↗ An alliance of innovations

Dr. Nicole Hoffmeister-Kraut, MP
Minister of Economic Affairs, Labour and Housing of the State of Baden-Württemberg

Baden-Württemberg is Europe's most innovative region. With a 4.8 percent share of the gross domestic product, the state's expenditures for research and development have already exceeded the 3% target to be achieved throughout Europe by 2020. Besides the development of new technologies, to make innovations, it is decisive for the path to innovation that the findings from research are translated into marketable products and processes. Therefore, the advancement of the technological transfer between science and research represents a focus area of the new state government.
With respect to this technological transfer, the industrial research institutions in the state and thus also the innBW innovation alliance play a significant role. Through their research activities, the innBW institutes not only explore new and interesting fields of technology for the industry. They also analyse and prepare findings from fundamental research for practical use and support companies in transforming innovative ideas into marketable products and processes. The Ministry of Economic Affairs, Labour and Housing of the State of Baden-Württemberg supports innBW by providing the basic funds and support for infrastructure development and research projects.
innBW's thirteen industrial research institutions are important partners, especially for small and medium-sized companies. Thanks to their years of experience collaborating with the industry, the institutes can quickly implement their comprehensive know-how into operational practice and thus transfer it to the industry. In this way, they make a significant contribution to the strengthening of the innovative capabilities of Baden-Württemberg's industry.

Dr. Nicole Hoffmeister-Kraut, MP

↗ Contents

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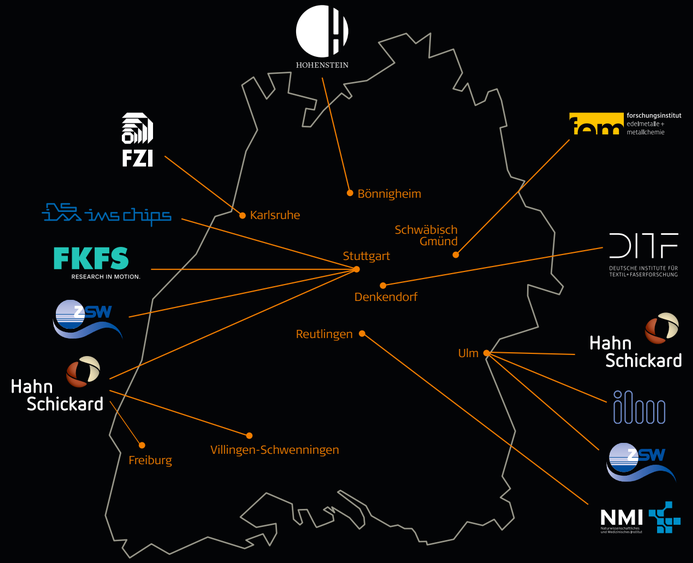
innBW's 12 independent research institutes are supported by the Ministry of Economic Affairs, Labour and Tourism.

Baden-Württemberg
MINISTERIUM FÜR WIRTSCHAFT, ARBEIT UND TOURISMUS

↗ innBW in Baden-Württemberg



The 12 member institutes ● of innBW not only cover a very broad range of topics but are also spread across the State of Baden-Württemberg.

The institutes closely cooperate with universities and universities of applied sciences in the state. Many professors working for innBW institutes also lecture at these universities and ensure an intensive knowledge transfer from fundamental to applied research.

↗ We are innovation

innBW is an innovation lighthouse. Technologies for a better tomorrow, in important forward-looking industries, often start there.

Many new innovative enterprises started as spin-offs.

innBW conducts comprehensive basic research which is funded by the State of Baden-Württemberg.

innBW has extensive experience in building project-based networks as well as cooperations and often plays a central role in them.

innBW in figures:
1,600 employees
4,300 industry projects each year
Total turnover: EUR 180 million

Passionate research. Connective thinking. Reliable action.

innBW sees itself as a bridge between industry and science and has its focus on the needs of medium-sized and large enterprises.

The main duty of innBW is the transfer of results from fundamental research at universities, for example, into marketable products, processes and services.

Especially small and medium-size enterprises benefit from the fact that they receive access to findings from research which they can hardly develop on their own.

↗ Added value for the industry

With more than 4,300 assignments from companies each year, innBW employees are most experienced in cooperating with industrial companies. Our profound scientific competencies have been proven in international research and cooperation projects with excellent partners.
Due to their extensive knowledge base, their outstanding technical equipment and their transfer competence, innBW's institutes are sought-after partners for many research projects aimed at developing high-tech products, top-notch processes and services.

"I am deeply convinced of the concept and advantages of this cooperation that contributes to the transfer of future-proof research results to their commercial use and practical application. Numerous examples demonstrate innBW's successful work in the area of application-oriented cutting-edge research."
Prof. Dr. Alfons Dehé
Spokesman of Innovationsallianz Baden-Württemberg

↗ Opinions

"At 2E mechatronic, we have been cooperating with several institutes from the innBW for several years now and have benefitted from their technological infrastructure. With this innovation alliance, the State of Baden-Württemberg has created a truly unique instrument to support the state's medium-sized enterprises."
Uwe Remer, Executive Director,
2E mechatronic GmbH & Co. KG, Kirchheim unter Teck

"Innovationsallianz Baden-Württemberg is an important technology partner for the development and the production of highly sophisticated optical components. Together we realise innovative ideas for the semiconductor industry."
Dr. Andreas Dorsel, Member of the Board
of Carl Zeiss SMT GmbH, Oberkochen

"With the development of technical textiles for a wide range of industries and applications, the textile industry makes a major contribution to the innovativeness of the state. The member institutes of the innBW are important partners for a structured innovation process in this regard."
Christoph Larsén Mattes, Executive Director,
Mattes & Ammann GmbH & Co. KG, Meßstetten

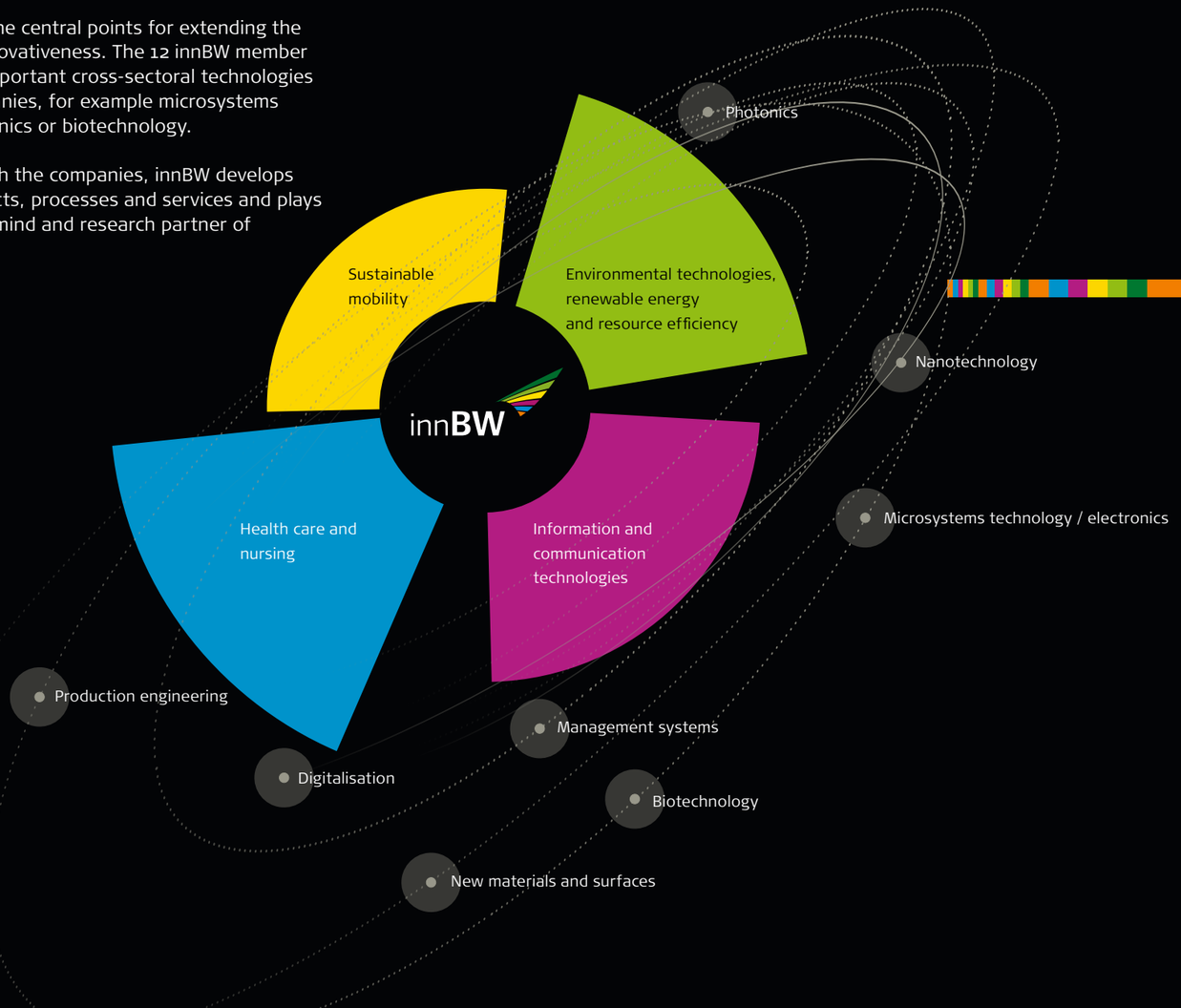
"With regard to the increasingly complex products, technology networks are seen as necessary facilitators for innovative enterprises. With its broad technology portfolio, Innovationsallianz BW is one of the best examples I know."
Dr. Harald Stallforth, Former Acting CEO of Aesculap AG, Tuttlingen

↗ Future and cross-sectoral technologies

Innovationsallianz Baden-Württemberg has identified four future areas of research for itself.

These represent the central points for extending the key industries' innovativeness. The 12 innBW member institutes make important cross-sectoral technologies available to companies, for example microsystems technology, photonics or biotechnology.

In cooperation with the companies, innBW develops marketable products, processes and services and plays its part as mastermind and research partner of the industry.



↗ We deliver innovative know-how

Every institute of the innBW innovation alliance has its own technical focus and a very specific profile of competencies. Together, the 12 institutes of the alliance offer a truly unique range of services covering the entire development process – from initial idea to marketable product.

Our services:

Applied research & development

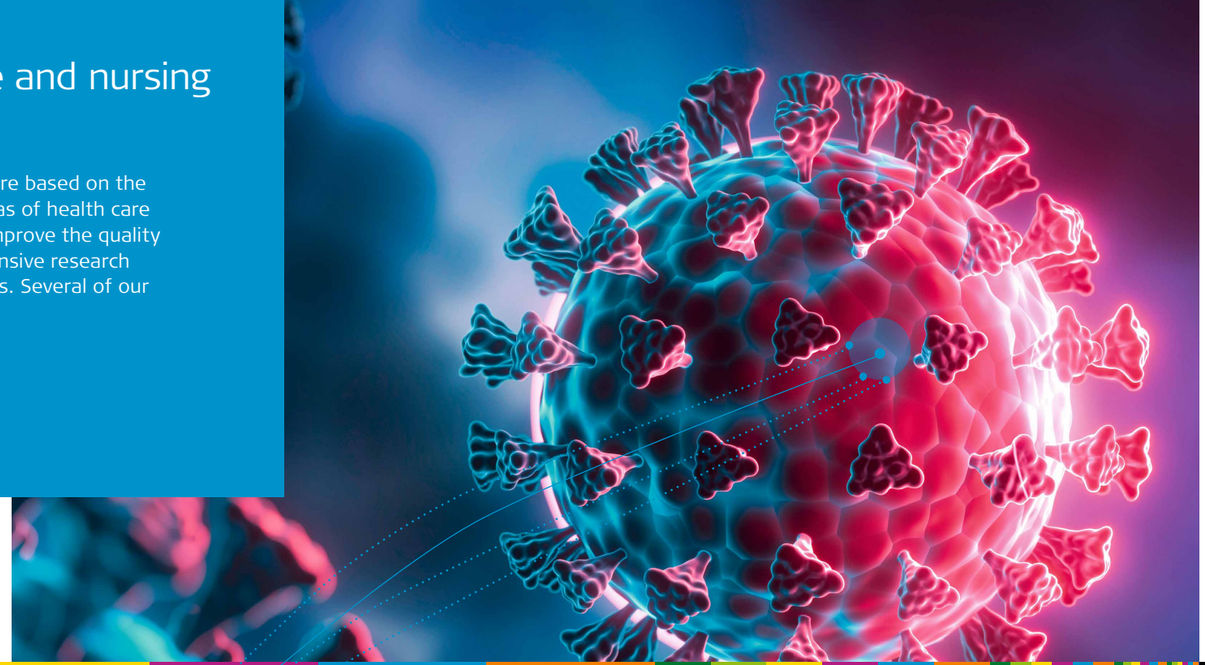
- Preparatory research
- Publicly funded research
- Contract research
- Development projects for third parties

Services

- Checking and testing for QA and compliance with standards
- Applications for funding
- Consulting
- Training
- Events
- Tests

Health care and nursing

Many medical success stories are based on the research done by us in the areas of health care and nursing, to continuously improve the quality of many people's life. Our extensive research portfolio includes many aspects. Several of our highlights are presented here.



Corona rapid test in PCR quality

Simple and safe to operate, time-saving and mobile – the PCR-based Corona rapid test with the Rhonda test system. A development by Hahn-Schickard with the medical technology company Spindiag from Freiburg.

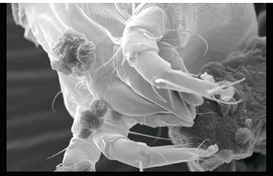
Hahn Schickard

Highlights for the industry

Fighting the Corona pandemic
During the Corona pandemic, innBW researchers fought the virus with many innovative approaches and research projects. One impressive success project was the development of a laboratory-grade corona point-of-care test. The test procedure, developed by Hahn-Schickard in collaboration with the medical technology company Spindiag, corresponds to the PCR-based gold standard of direct virus detection. It is based on the joint research work for the detection of multi-resistant germs and will in future be able to detect up to 36 viral and bacterial parameters in well under an hour, directly on site at the patient. One of the first sites to use the innovative test was Klinikum Stuttgart. The state of Baden-Württemberg funded the development with 6 million euros.

MDR & IVDR Competence Center (MIK)
MIK supports SMEs in meeting the requirements of the new MDR/IVDR regulations, develops appropriate analytical and testing methods, and accompanies industry partners all the way to product approval.

NMI Hahn Schickard



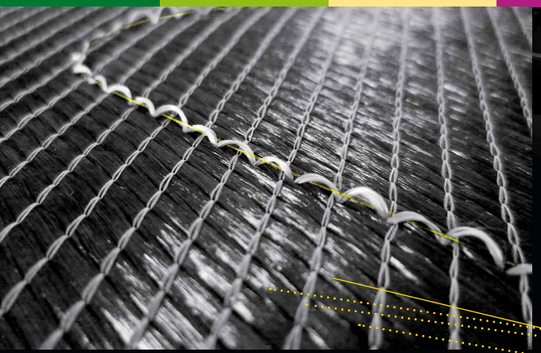
Compatible bed linen for persons allergic to house dust mites
Together with Centa-Star, a manufacturer of bed linen, the Hohenstein institutes developed a marketable textile finish that binds 99.5 % of these allergens, is wash-resistant, and does not require encasing.

HOHENSTEIN

Optical dental impression
As an alternative to silicone impressions, ILM developed an optical 3D scanner for precise and non-contact measurement of tooth topology.

Sustainable mobility

This forward-looking topic gains more and more importance because it deals with the managing of increasing traffic and environmental protection at the same time. This is why we have been involved in research and development in this area for years and have gained a great amount of experience to be able to stay at the top in the future as well.



Intelligent lightweight construction

Highly rigid carbon components with integrated sensors are the basis for cars with an improved energy balance. Quite special is the opportunity to monitor its functions permanently.

DITF
DEUTSCHE INSTITUTE FÜR TEXTIL+FASERFORSCHUNG

Highlights for the industry

Highly rigid lightweight structures for the cars of tomorrow

Sustainable mobility is closely connected with lightweight construction. Ultra-light fibre composites offer special potential for weight and functional optimisation. The DITF institutes develop lightweight components, from fibre to surface, their functionalisation, and finished parts.
A new carbon fibre developed by DITF on the basis of renewable raw materials features a positive environmental balance and excellent mechanical properties while being more cost-efficient in production. It is processed further at the DITF centre for lightweight components. This centre makes available the full process chain, including design and simulation, textile and preforming processes, and production and component testing. This creates new highly rigid fibre composites meeting extreme performance requirements.

Semi-autonomous user-adaptive cars

FZI conducts research on fundamental processes, methods, and technologies for future driver assistance systems and intelligent vehicles. The test vehicle drives autonomously and is fully equipped with measuring instruments and high-performance computers for testing new functions.

FZI

Archtitecture of future charging infrastructure

DThe FKFS identifies and defines the functions, technical requirements, safety requirements, boundary conditions and architecture design regarding charging communication for a future charging infrastructure in the context of electrified and automated driving.

FKFS
RESEARCH IN MOTION.

Perspectives for battery production

The ZSW in Ulm has been operating Europe's largest research platform for large lithium-ion cells (FPL) since 2014. It is currently being expanded to include a format-flexible cell assembly for pouch and PHEV-2 cells up to 80 Ah and round cells of type 21700. A new pilot plant for active materials will go into operation at the end of 2023.

ZSW

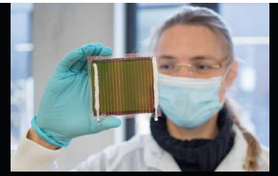
Resources, energy and environmental technologies

In times when raw materials are becoming scarcer and more expensive, new options must be examined and new strategies developed to maintain the competitiveness of companies and to reduce environmental impacts. This area holds enormous potential and we are proud to be part of this development.

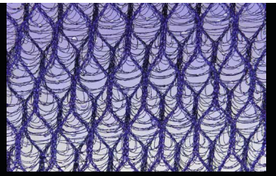
Joint project »BW Electrolysis«
For the industrialization of electrolysis technology: Design and construction of an electrolysis demonstrator at ZSW

↗ Highlights for the industry

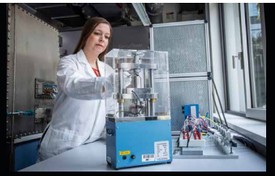
Market ramp-up of electrolysis technology
Green hydrogen is a key element of the energy transition. The climate-friendly energy carrier is produced from renewable energies using water electrolysis. The demand for electrolysers will increase strongly in the future. The »Electrolysis made in Baden-Württemberg« project is about industrializing electrolysis technology and ensuring international competitiveness for medium-sized companies from Baden-Württemberg. To accelerate the market ramp-up of electrolysis, the four research institutes ZSW, Hahn-Schickard, DITF and DLR have joined forces in the project. An electrolysis demonstrator »Made in Baden-Württemberg« of the MW power class was built at ZSW.
In addition to the research activities on electrolysis, the ZSW is also pushing ahead with the topics of electricity-based fuels (eFuels) and fuel cells and is implementing developments up to near-series scale.



Photovoltaics: More powerful in tandem
Solar modules consisting of two superimposed cells that utilize different areas of the solar spectrum promise maximum efficiency. The novel perovskite solar cells in tandem with silicon cells, for example, are suitable for this purpose.



Textile fine dust trap
3D spacer textiles wash fine dust out of the air: unlike conventional air filters, the air-permeable water curtain functions like a wet scrubber. The principle, which is based on the canary pine, is also suitable for collecting drinking water in dry areas.



Batteries: It's the gel that does it
Lithium-sulfur battery systems have a high theoretical specific energy. New components are needed to increase battery safety, energy density, cycle stability and lifetime. These include innovative hybrid gel-polymer electrolytes.

Information and communication

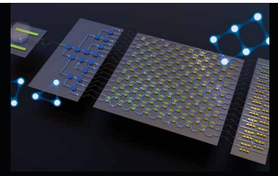
Networks are becoming more and more important and many achievements facilitate our everyday lives and have become indispensable. Developements that have been formerly dismissed as utopian visions have become daily routines. Therefore, we passionately conduct research to find new and better ways of interaction for the benefit of all people.

With the SleepCoach app, the user keeps an electronic diary and thus develops an understanding of which circumstances are vital for a restorative sleep.

FZI

Highlights for the industry

A good night's sleep thanks to SleepCoach
Sleep is a basic need of all human beings as well as a requirement for good health and a high quality of life. To be able to portably measure the quality of sleep and any influencing factors, the FZI, movisens GmbH, and the Sleep Medicine Centre at the University Hospital of Freiburg developed a SleepCoach system as an SME innovation project:
Through an innovative sensor worn on the wrist, the system records cardiorespiratory parameters and the user's movements 24 hours a day. Based on these data, a sleep profile is created and an objective value for the user's sleep quality is determined. With an electronic diary, the SleepCoach app also asks for sleep influencing factors, for example coffee, and provides the user with information about the topic of sleep. The app computes the relationships between individual factors and the quality of sleep and visualises its results.



PhotonQ – Chips for future quantum computers
Silicon photonics enables the fusion of optical and electronic circuits on a common chip. In the PhotonQ project, IMS CHIPS, together with the University of Stuttgart and other partners, is researching processors for measurement-based photonic quantum computers.

ims chips

AI Data Tooling
In this research project, tools and methods for the provision of data from all modalities (camera, lidar, radar, IMU, etc.) for AI-based functions are being developed and investigated for the first time.

FKFS
RESEARCH IN MOTION.

Capacitive sensors
With high precision capacitive inclination sensors, Leica laser measuring tools cannot only measure lengths but also heights. After having successfully transferred this technology to 2E mechatronic, Hahn-Schickard together with a medium-sized Baden-Württemberg company is developing level sensors for washing machines and dish washers.

Hahn Schickard

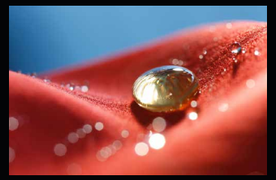
Cross-sectoral technologies

Cross-sectoral technologies are not only applied in individual areas but are also used in many fields or industries. Often, cross-sectoral technologies are used to improve products first and then result in innovations that are based on the specific advantages of these technologies. The institutes belonging to the Innovationsallianz Baden-Württemberg concentrate on seven important cross-sectoral technologies.

Here we cite some examples for ground-breaking innovations from the wide range of applications of these essential cross-sectoral technologies.

↗ Nanotechnology

Nanofunctionalised textiles



Nanotechnology offers an enormous potential for the development of textile products with a whole universe of new functions and product features; with applications ranging from fabrics on which spots won't stand a chance to antimicrobial or electro-conductive textiles or bathing suits that won't get wet.

DITF DEUTSCHE INSTITUTE FÜR TEXTIL+FASERFORSCHUNG

HOHENSTEIN

↗ Microsystem technology / electronics

Transport monitoring of medical samples

SmartTube – With the intelligent blood tube, Hahn-Schickard, together with Smart4Diagnostics, is driving forward the digitalization and automation of the preanalytical supply chain. The blood tube with the sensory unit ensures that decisive boundary conditions such as temperature influence or sample age can be taken into account during analytical laboratory testing.

Hahn Schickard

↗ New materials and surfaces

Bulk metallic glasses

The development of new alloys and production methods are key areas of interest in the department of metals research. Current R&D projects involve precious metal alloys, for example bulk metallic glasses for watches, jewellery and functional materials, new production processes, for example selective laser melting, thermodynamic simulation of material that can be used to optimise casting processes or materials for biomedical applications.

fem forschungsinstitut edelmetalle + metallchemie

↗ Biotechnology

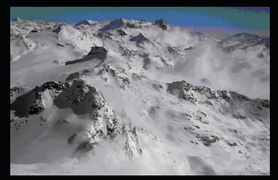
PRIMO – Personalized medicine for tailor-made cancer therapies

Every person is unique, and so is their health. A diagnosis is not always followed by the same therapeutic approach. In principle, patients respond differently to treatment. In cancer therapy, personalized approaches can improve treatment options. At NMI, technologies and workflows are being developed that enable the collection of important molecular information in addition to genetic data.

NMI Hahn Schickard

↗ Photonics

Avalanche warning device

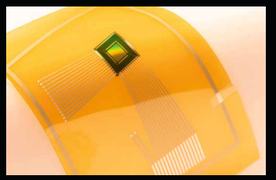


ILM has unique knowledge and experience in correlating optical properties of matter to its microstructure and composition. This is used to develop devices not only for medical diagnostics, but also for quality control in food production, or for the analysis of snow depth profiles.

ILM

↗ Production technology

Production platform for micro systems



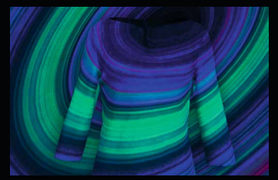
PRONTO – Series production of microsystems for SMEs and research. PRONTO combines the capabilities available at these institutes for the development and production of microsystems from foil electronics, MID technology, precision injection molding and microfluidics.

Hahn Schickard

iws chips

↗ Digitalisation

Simulate, print and go – fashion inspired by technology



Once accepted, digital technologies have the potential to induce a paradigm change and they offer companies completely new options. New technologies and integrated workflows give the textile and clothing industry a new profile. Digital technologies integrate 3D design, and link production and the latest production technologies. A milestone on the way to individualised and sustainably produced fashion. The institutes at DITF provide concepts, methods, and tools for the need-based promotion of these dynamic changes.

DITF DEUTSCHE INSTITUTE FÜR TEXTIL+FASERFORSCHUNG

↗ DITF

German institutes of textile and fiber research Denkendorf

The DITF are Europe's largest textile research center. They are the only textile research institution worldwide to conduct application-oriented research across the entire textile production chain. From idea generation to material research, development of prototypes and production processes, to pilot production and testing, the DITF are important R&D partners for industry and service companies. Since 1921, they have occupied all important textile topics.

Textile solutions and fiber-based materials for applications in:

- Architecture and construction
- Health and care
- Mobility
- Energy and environment
- Production technologies
- Clothing and home textiles

DITF
German institutes of textile and fiber research
Denkendorf
Prof. Dr.-Ing.
Götz T. Gresser
Körschtalstraße 26
73770 Denkendorf
Tel. +49.711.9340126
goetz.gresser@ditf.de
www.ditf.de

DEUTSCHE INSTITUTE FÜR TEXTIL+FASERFORSCHUNG

↗ fem

Research Institute for Precious Metals and Metal Chemistry

The Research Institute for Precious Metals and Metal Chemistry (fem) in Schwäbisch Gmünd, established in 1922, is an independent non-profit institute and operates in the field of surface technology, metallurgy and precious metals. It is the only independent institute for precious metals research world-wide and deals with the various issues of material science and surface technology in interdisciplinary, publicly funded research projects.

Competencies/areas of business

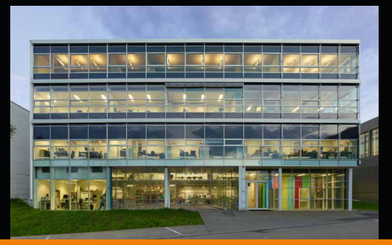
- Physical metallurgy, material testing, precious metals research
- Electrochemistry, electroplating, corrosion
- Light metal surface technology
- Plasma surface technology, Material physics
- Analytics

fem
Research Institute
for Precious Metals and
Metal Chemistry
Prof. Dr. Holger Kaßner
Katharinenstraße 17
73525 Schwäbisch Gmünd
Tel. +49.7171.1006-120
kassner@fem-online.de
www.fem-online.de

forschungsinstitut edelmetalle + metallchemie

↗ Hahn-Schickard

Institute for Micro Assembly Technology



Competencies/areas of business

- Sensors. Everywhere!
- Optical Microsystems
- Rapid Manufacturing
- System-in-Foil
- Spatial electronics
- Microstructuring

Institute for Information and Microtechnology

Competencies/areas of business

- Sensors + systems: development, integration, and production
- Cyber-physical systems
- Software solutions
- MEMS Foundry

Institute for Micro Analysis Systems

Competencies/areas of business

- Mobile diagnostics
- Automation of biochemical tests
- Microfluidics
- Lab-on-a-Chip Foundry

Hahn-Schickard is known for industry-relevant research, development and production in the area of microsystem technology. More than 200 employees in Stuttgart, Villingen-Schwenningen, Freiburg, and Ulm develop solutions in microsystem technology – from the initial idea to production. In close cooperation with the industry, we realise innovative products and technologies in the areas of sensor and actuator technology, system integration, cyber-physical systems, lab-on-a-chip and analytics, micro-electronics, packaging of integrated circuits, micro-assembly, and reliability.

Hahn-Schickard
Prof. Dr.-Ing. André Zimmermann,
Dr.-Ing. Karl-Peter Fritz
Allmandring 9 B
70569 Stuttgart
Tel. +49.711.685-83712
Andre.Zimmermann@Hahn-Schickard.de

Hahn-Schickard
Prof. Dr.-Ing. A. Dehé,
Prof. Dr. Oliver Amft
Wilhelm-Schickard-Str. 10
78052 Villingen-Schwenningen
Tel. +49.7721.943-0
Alfons.Dehe@Hahn-Schickard.de

Hahn-Schickard
Prof. Dr.-Ing. Roland Zengerle,
Prof. Dr. Felix von Stetten,
Prof. Dr. techn. Boris Mizaikoff
Georges-Köhler-Allee 103
79110 Freiburg
Tel. +49.761.203-73200
Roland.Zengerle@Hahn-Schickard.de

Hahn Schickard

↗ FKFS

Research Institute for Automotive Engineering and Vehicle Engines Powertrain Systems Stuttgart

The Research Institute for Automotive Engineering and Vehicle Engines Powertrain Systems Stuttgart (FKFS) is located on the Vaihingen campus of the University of Stuttgart. With over 90 years of experience in automotive development and excellent know-how, the independent institute works as a development service provider on complex problems and tasks on behalf of the international automotive industry as well as on publicly funded research projects.

Competencies/areas of business

- Vehicle drive from combustion engine to e-drive
- Vehicle technology from vehicle aerodynamics to vehicle and vehicle dynamics
- Automated and connected driving, automotive mechatronics, E/E

FKFS – Research Institute for Automotive Engineering and Vehicle Engines Powertrain Systems Stuttgart
Prof. Dr.-Ing.
André Casal Kulzer
Pfaffenwaldring 12
70569 Stuttgart
Tel. +49.711.685-66646
andre.kulzer@fkfs.de
www.fkfs.de

↗ FZI

Research Centre for Information Technology

The FZI Research Centre for Information Technology at the Karlsruhe Institute of Technology is a non-profit institution for applied research in information technology and technology transfer. Its task is to provide businesses and public institutions with the latest research findings in information technology. Young scientists get trained for their carrer in academics or business as well as in self-employment.

Competencies/areas of business

Concepts, software, hardware and systems in the areas of

- Energy
- Health Care
- Knowledge and information services
- Software development
- Mobility
- Automation and robotics
- Production and logistics

FZI Research Centre for Information Technology
Jan Wiesenberger
Haid-und-Neu-Str. 10–14
76131 Karlsruhe
Tel. +49.721.9654-0
wiesenberger@fzi.de
www.fzi.de

↗ HIT

Hohenstein Institut für Textilinnovation gGmbH

The Hohenstein Institute, with a total of about 650 employees at their Bönnigheim site and 45 contact offices around the world, is among the most important independent research and testing institutions in the textile sector. Its core competencies are not only the application-oriented research and development of innovative products and processes but also a wide range of tests and certifications.

Competencies/areas of business

- Functionalised textiles
- Medical textiles
- Hygiene and biotechnology
- Pattern making and fit testing
- Personal protective equipment
- Textile care
- Wear and sleep comfort
- UV protection
- Colorimetry and white metrics
- Odour analysis

HIT
Hohenstein Institut für Textilinnovation gGmbH
Prof. Dr. Stefan Mecheels
Schlosssteige 1
74357 Bönnigheim
Tel. +49.7143.271-0
s.mecheels@hohenstein.de
www.hohenstein.com

↗ ILM

Institute for Laser Technology in Medicine and Metrology

As an institute of applied photonics and optics research, ILM represents an important enabling technology. Outgoing from problems in the field of medicine, interdisciplinary teams involving natural scientists and engineers explore new applications of light and apply them in practice in terms of devices for therapy, therapy control and diagnosis as well as for non-medical applications.

Competencies/areas of business

- medicine/health: laser therapy, tissue characterisation, germ detection
- analytics: sensors for process and quality control (pharma, food, agriculture, environment)
- industrial metrology: devices to measure topology and roughness, surface inspection (e.g. layer thickness, hardness)

ILM, Institute for Laser Technology in Medicine and Metrology at Ulm University
Alexander Hack
Helmholtzstraße 12
89081 Ulm
Tel. +49.731.1429-100
alexander.hack@ilm-ulm.de
www.ilm-ulm.de

↗ IMS CHIPS

Institute for Microelectronic Stuttgart

The Institute for Microelectronic Stuttgart is involved in research and small series production in the areas of silicon technology, customised circuits (ASIC), nanopatterning and image sensor technology. The institute sees itself as a partner of small and medium-sized companies and cooperates with global leaders in the semiconductor and supplier industries. IMS CHIPS is also active in the area of professional development and training.

Competencies/areas of business

- Integrated Circuits and Systems: Electronic Micro Systems, Artificial Intelligence, Imaging Sensors, GaN Components & Systems, Flexible Electronics
- Silicon Photonics: Photonic Systems, Quantum Sensors, Heterogeneous Integration
- M(E)MS Technology: Large-area M(E)MS, Silicon Technologies
- Nanostructuring: Optical Components, Nano-Imprint Mastering, Nano-Structuring Quartz & Silicon

IMS CHIPS, Institute for Microelectronic Stuttgart
Prof. Dr.-Ing.
Joachim Burghartz
Allmandring 30a
70569 Stuttgart
Tel. +49.711.21855-0
burgh@ims-chips.de
www.ims-chips.de

↗ NMI

Natural and Medical Sciences Institute at the University of Tübingen

NMI conducts application-oriented research where bioscience and material science meet and features a unique and interdisciplinary spectrum of competencies. It provides R&D services for the health industry and Baden-Württemberg's key industries which are mechanical engineering, toolmaking and automotive. The NMI is well-known beyond the state's borders as a business incubator for start-up companies.

Competencies/areas of business

- Pharmaceuticals & Biotechnology: Targets and biomarkers for drug discovery and diagnostics, bio-analytics, electrophysiology, cellular test systems
- Biomedicine & Material Sciences: Biomedical Engineering, Regenerative Medicine, Biomaterials, Medical Technology, Sensor Development, Material and Surface Analysis, Micro- and Nanoanalytics

NMI, Natural and Medical Sciences Institute at the University of Tübingen
Prof. Dr. Katja Schenke-Layland
Markwiesenstraße 55
72770 Reutlingen
Tel. +49.7121.51530-0
katja.schenke-layland@nmi.de
www.nmi.de

↗ ZSW

Centre for Solar Energy and Hydrogen Research Baden-Württemberg

ZSW is one of the leading institutes for applied research in the areas of photovoltaics, renewable fuels, battery technology, fuel cells and energy systems analysis. We break ground for new technologies to enter the market. From material research to the development of prototypes and production processes, application systems, quality tests and market analyses, we cover the entire value-adding chain. Our truly comprehensive expertise is important for our partners from the industry and our key to success.

Competencies/areas of business

- Electrolysis & eFuels
- Fuel cells
- Batteries
- Wind energy
- Photovoltaics
- Energy transition & system optimization
- Circular economy

ZSW
Centre for Solar Energy and Hydrogen Research Baden-Württemberg
Prof. Dr. Frithjof Staiß
Meitnerstraße 1
70563 Stuttgart
Tel. +49.711.7870-0
frithjof.staiss@zsw-bw.de
www.zsw-bw.de

↗ innBW office

Office of the Innovationsallianz Baden-Württemberg e.V.

The innBW office, located in the Haus der Wirtschaft in Stuttgart, coordinates innBW's diverse tasks to further establish and develop the alliance at the state, federal and EU levels. It is the central point of contact both internally for the institutes of innBW and externally for companies – especially SMEs – for associations, clusters, chambers and other intermediaries, for funding agencies and politics. Its main task is to promote technology transfer in the state

Tasks & Competencies

- Promotion of cooperation and networking among innBW institutes
- Communication and public relations
- Central contact point for stakeholders from science, business and politics
- Information about the transfer activities of the innBW institutes

innBW
Innovationsallianz Baden-Württemberg e.V.
Anke Fellmann
(Management)
Willi-Bleicher-Straße 19
70174 Stuttgart
Tel. +49.151.21605356
anke.fellmann@innbw.de
www.innbw.de