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PRESSE-INFORMATION

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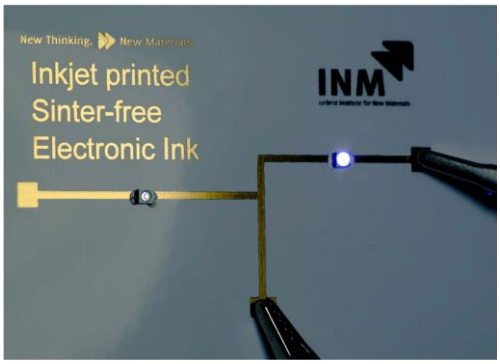
Tamper-proof sensor technology with materials from the INM



Printed circuit with electrically conductive ink from INM
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It is impossible to imagine the modern world without electronic sensors, and certainly not the automotive world. They increase the reliability of vehicles, enable new functions and help reduce costs. To do this, they must be safe from manipulation - which is not always the case today. In the sensIC project, which is funded by the German Federal Ministry of Education and Research (BMBF) with 2.9 million euros, seven collaborative partners from science and industry, including the INM - Leibniz Institute for New Materials in Saarbrücken, are researching how sensors can be manufactured in a tamper-proof manner and integrated directly into products.

From vehicles to industrial plants, connections are made everywhere via hoses. Sensors are often attached to these passive components, monitoring temperature or pressure, for example, and generating safety-critical data that is inadequately protected against manipulation and hacker attacks. How can the sensor electronics be made trustworthy and also clearly identifiable? Prof. Tobias Kraus, project manager at INM, puts it this way: "We want to make the simple tubes intelligent. To do this, we are creating hybrid sensor electronics by integrating sensors equipped with special safety and identification features into the hose material. This can only be done with special materials and processes developed and contributed by the collaborative partners. INM supplies inks for printing conductive tracks and sensors and helps develop the processes for their processing."

The sensor system to be embedded in the tube is made from various components and then encapsulated. A thin silicon chip, printed electronics with a physical uncloneable function (PUF) security feature and an external tamper protection with particle-based fluorescence identification (tamp protection) are additively combined for this purpose.

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The PUF, which is being developed by the Karlsruhe Institute of Technology (KIT) with materials from INM, reflects minimal variations in the production process. Thus, each component has a unique digital fingerprint that makes it uniquely identifiable and protects it against counterfeiting.

The project focuses on temperature management in electric vehicles. Hoses with integrated temperature sensors are to be used in the battery environment. This is intended to rule out any manipulation of the sensors from production to use of the vehicle. Other areas of application include manufacturing processes in the pharmaceutical and food industries, where the highest possible level of safety is essential.

The BMBF-funded project, which will run for three years, started in May 2021. In addition to the 2.9 million euros provided by the BMBF under the framework program "Microelectronics from Germany - Driver of innovation for the digital economy," the project partners are contributing a total of 1.35 million euros. The project is coordinated by Continental AG. In addition to INM - Leibniz Institute for New Materials, other project partners include the Karlsruhe Institute of Technology (KIT), Cyient, Polysecure, Offenburg University of Applied Sciences and Elmos Semiconductor.

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The INM

New materials are the drivers for new technologies. The INM, located in Saarbrücken, combines multidisciplinary science and materials-oriented technology transfer under one roof. Chemistry, physics, biology, materials science and engineering work together in close cooperation. A major focus of INM's research is the transfer of biological principles to the design of new materials, structures and surfaces. The INM is an institute of the Leibniz Association. It is networked worldwide with numerous research organizations and technology companies.

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