

### 1 RFID tags

(source: Albert Lozano – Fotolia).

### 2 Possible evaluation circuit and sensor signal over time when exceeding a critical temperature

(source: Torbz – Fotolia).

## IRREVERSIBLE ELECTRONIC TEMPERATURE INDICATOR

### Current situation

At present, the only way to determine and monitor temperature electronically is to measure, save and process data continuously, requiring a permanent power supply. Wireless measurement solutions therefore always have a limited life. However, there are some applications, such as temperature-controlled freight shipments or maintenance of installations, where it is simply necessary to monitor if a temperature threshold is being exceeded. This information in itself can be used to ensure a continuous cold chain and/or check for signs of wear and tear. However, typical temperature strips which provide such a function can only be read off manually. For these applications wireless digital technologies such as RFID tags, for example, are particularly good for easily

recording such data, as they enable it to be read off and processed automatically while large quantities can be manufactured in a cost-effective way.

### IPA's solution

It is for such applications that Fraunhofer IPA has designed a temperature sensor which generates a permanent, electrically measurable output if a predetermined temperature is exceeded. It does not need a power supply in order to function and be triggered. With its duty ratio of >10,000, a cross of temperature threshold generates a reliable signal which can be easily detected. The information on the event is also saved without any electrical supply. An energy source is only required to read off the sensor data automatically.

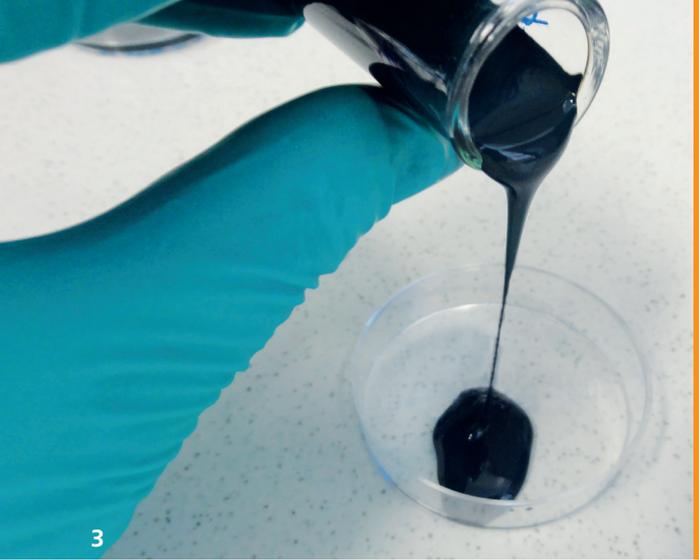
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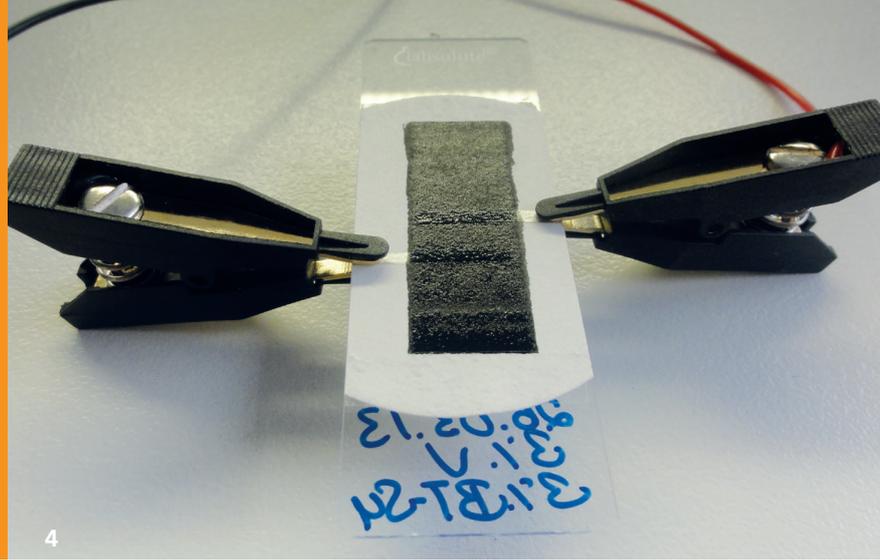
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### Our offered services

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We will support you in adapting this temperature sensor to your specific requirements. We offer the following range of services:

- Adapting trip temperature for temperatures > 30 °C
- Adapting to your production process
- Testing different print technologies
- Determining electrical and thermal characteristics
- Project coordination

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### The benefits for you

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Our sensor technology offers temperature monitoring without needing a power supply. It trips reliably if temperature limits are exceeded with a duty ratio of >10,000. The sensor saves the event internally, lasts indefinitely, and can be read off electronically. It can also be implemented using a wide range of printing processes. The sensor technology which has already been patented, offers innovative advantages over competing products.

We look forward to helping you find a solution to your specific application requirements.

3 Coating material before use

4 Reading out printed sensor

(source: Fraunhofer IPA).