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INM-KOLLOQUIUM

"IRREVERSIBLE SENSORS FOR FOOD FRESHNESS AND SAFETY BASED ON DEGRADABLE POLYMERS"

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INM, Leibniz-Saal, Campus D2 5
Gastgeber: Prof. Dr. Tobias Kraus

Responsive materials – which undergo a measurable change in property in response to a desired stimulus – have been developed for and implemented in a variety of sensors. Such materials typically undergo reversible changes, allowing real-time measurement of the desired condition (e.g. temperature, humidity, analyte concentration). To enable tracking of *cumulative* exposure to analytes such as environmental stimuli, bacteria, or time, responsive materials that undergo *irreversible* changes are desirable. These materials could record cumulative exposure without the need for a power supply or integrated circuit. In my group, we are therefore utilizing degradable polymers – including polyhydroxybutyrate (PHB) – as the basis for irreversible sensors. PHB is an attractive material for these systems as it is a microbially-produced biopolymer that is enzymatically degraded by various types of bacteria. In our work, we have developed new techniques for controlling the properties of PHB (e.g. crystallinity, degradability), and we have designed a simple optical technique for characterizing the enzymatic stability of this material with high sensitivity.

To engineer time-temperature indicators that undergo visible changes in optical properties, we have demonstrated dye-loaded PHB films that degrade when exposed to enzyme solutions. The activation energy of these systems is well matched to the activation energy associated with food spoilage. To produce systems in which the electrical properties of the material change as a function of time, conductive polymer composites have been formed. We have taken two approaches for forming these composites: solvent casting of reduced graphene oxide, and melt-mixing with carbon nanotubes. In this presentation I will compare and contrast these approaches, and describe how they can be incorporated into wireless sensing devices, particularly for the detection of pathogenic bacteria.

Wir laden 15 Minuten vor Beginn zu einem Get-together mit der Referentin ein.

KONTAKT

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