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Speaker

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Title

Toward high-performance sensing - recent developments in the field of organic photodetectors

Abstract

Modern innovations such as heartbeat and blood-oxygen measurements in lightweight smartwatches, food quality monitoring, and automated industrial production are driven by novel sensor technologies. In this regard, organic photodetectors promise significant advances because of their favorable physical properties and low-cost production. Recent research has rapidly improved all performance parameters of these detectors, bringing them on par with, or even better than, inorganic counterparts such as silicon or indium gallium arsenide photodetectors in several aspects. In particular, organic photodetectors can be designed directly for specific wavelengths. This advantage makes expensive, bulky optical filters obsolete and enables miniature spectroscopic detector devices.

This presentation will introduce the basic functional principles of organic photodetectors and explain the key performance indicators. We will discuss recent developments and challenges in the field, followed by three specific challenges and current research insights. The talk will focus on advancing device architecture to achieve narrowband photodetection for spectroscopic applications. The second topic introduces strategies to enhance the photodetection signal through photomultiplication processes; last but not least, we will discuss recent insights into organic photodetectors for high-speed visible-light communication in detail.

Short biography

Johannes Benduhn studied Physics at the University of Greifswald (Germany), University of Wrocław (Poland), and TU Dresden (Germany), where he obtained his Master of Science (2015) and Doctoral degree (2019) under the supervision of Prof. Koen Vandewal. Afterward, he joined the start-up Senorics GmbH, which expedites mobile spectroscopy

solutions based on organic photodetectors. Since 2020, Johannes Benduhn has been leading the research group “Organic Sensors and Solar Cells” at TU Dresden in the professorship of Prof. Karl Leo. His main research interests range from studying fundamental processes in organic semiconductors to improving optoelectronic devices by employing new materials and exploring new device architectures. Recently, Johannes joined the German Center of Astrophysics as deputy of the Center for Technology Development, where he is establishing a new research infrastructure that researches new technologies for astrophysical applications and aims for regional impact through transfer activities.