

Polymer-based optical sensor platform with integrated light source

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Abstract:

Nowadays, we live in a world which is becoming more digital-driven and automated. Sensors, especially optical sensors are playing a more and more important role due to their various application possibilities in the bio-detection, drug development as well as chemical analysis. Optical sensors based on evanescent field sensing provide very high selectivity and sensitivity for the detection of chemical and biological substances distributed in liquids or gases. By simply replacing the sensing layer, different kinds of substances could be detected by using the same sensor platform. Unfortunately, till now, such kind of sensor platforms are mainly fabricated on rigid substrates, such as glass or semiconductor materials with relatively high fabrication cost and complicated manufacturing processes.

In this project, a planar optical sensor platform with integrated organic laser as optical light source, single-mode waveguide structures, sensor systems and organic photodiodes will be fabricated on a flexible polymer foil. A novel electrically tuned laser concept will be developed for the optically pumped organic laser source which is very important for the polymer sensor systems. In order to realize the integration purpose, novel manufacturing processes will be developed and optimized in this project. By applying such kind of manufacturing methods, polymer-based optical sensor platforms could be fabricated cost effectively with high precision.

A team of experts in polymer technology and polymer processing (University of Freiburg) and experts in organic optoelectronics (TU Braunschweig) will work together in this project.