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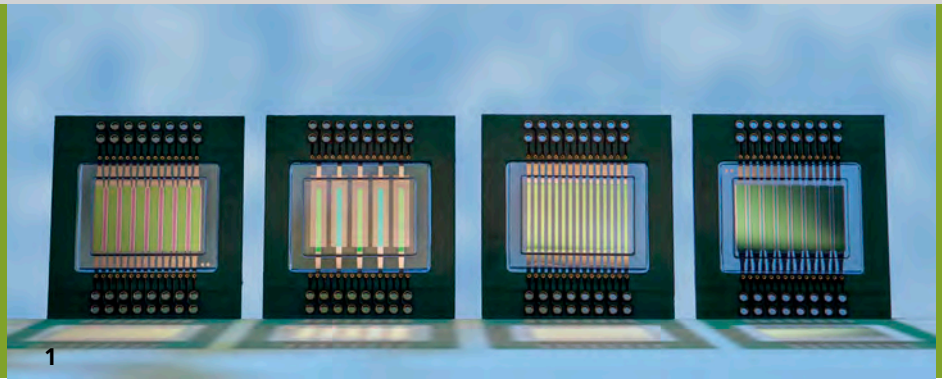

1 *OLED and OPD structures integrated on glass substrates*

PHOTODIODE / OLED PLATFORM FOR ANALYTICAL APPLICATIONS

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Motivation

The combination of light sources and light detectors on one compact module enables the measurement of reflection or photoluminescence for analytical applications.

With the help of organic electronics, photodiodes (OPD) and light-emitting diodes (OLED) can be produced cost-effectively on simple glass substrates. Both component types (OPD and OLED) can be integrated into application-specific geometries on the same glass substrate. The size of the light-emitting and light-absorbing areas can be optimally adjusted with each other.

Technology

The Fraunhofer FEP is developing organic photodiodes that can be modified for specific applications. Thereby the spectral sensitivity as well as the device areas can be adapted according to customer requirements. Figure 1 shows examples of different designs.

The optically active surfaces of the organic components can be structured arbitrarily from small pixels up to larger surfaces. Due to the possibility of integrating the photodiodes on polymer films, flexible components are also feasible.

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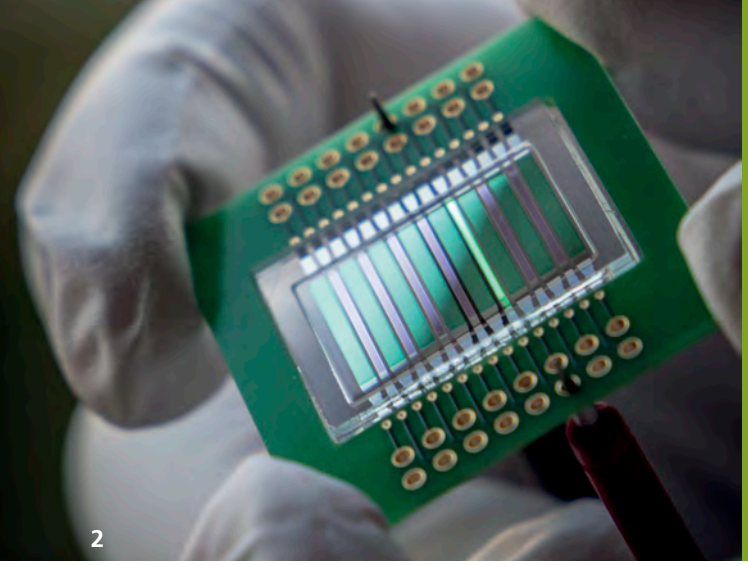
PHOTONICS21

MOLOKO
www.moloko-project.eu



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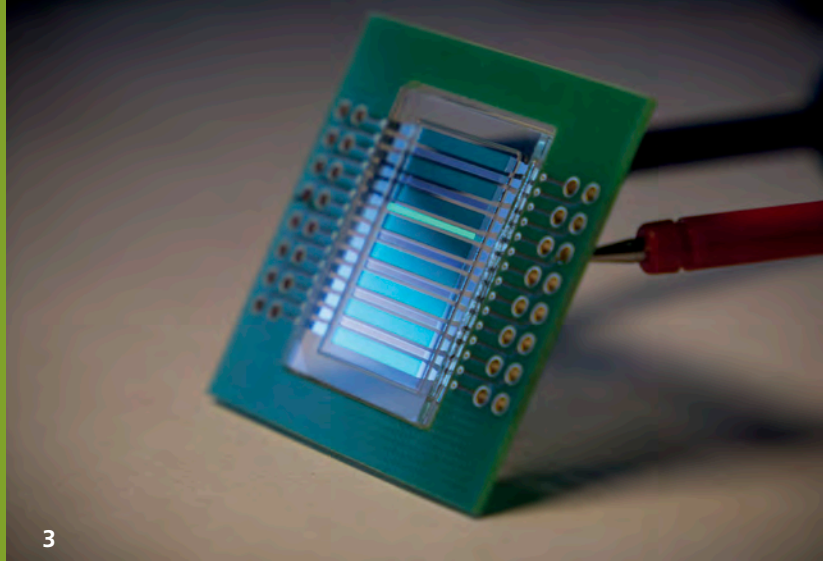

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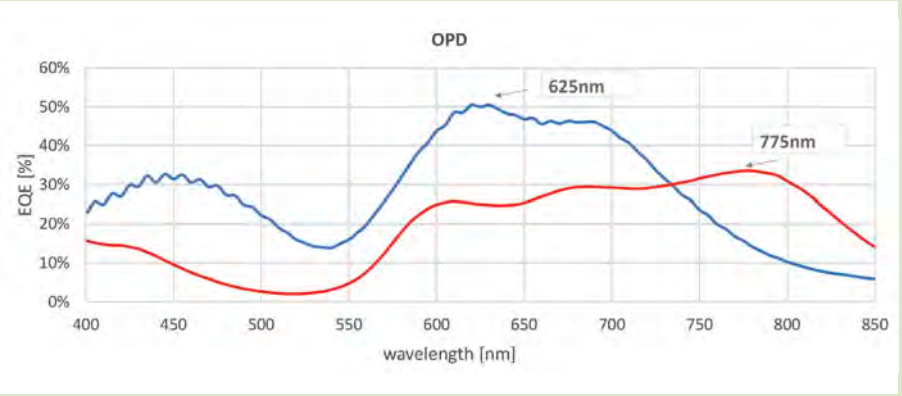
The organic devices offer great potential for different applications since the sensitivity is covered over a wide wavelength range from currently 300 nm (ultraviolett, UV) over the entire visible range up to 850 nm (near infrared, NIR). The use of industry-relevant substrate sizes of 200 mm silicon wafers, glass substrates or films on carrier wafers paves the way for this new technology to move from research to a whole variety of industrial applications.

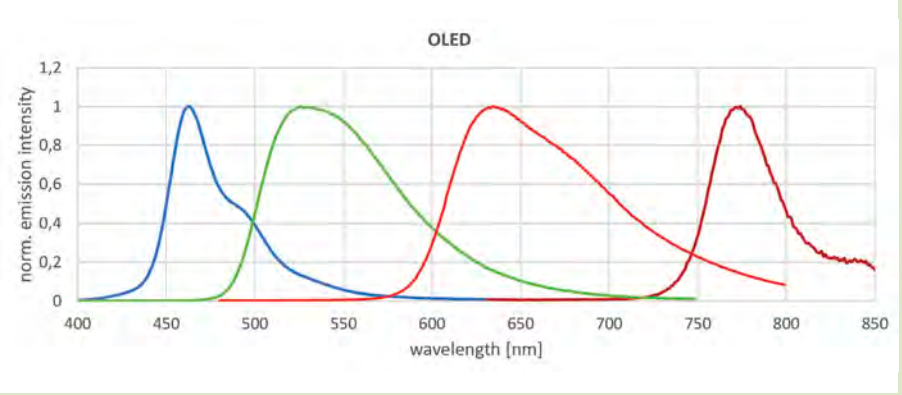
Applications

An example of an analytical application currently being investigated in the EU-funded project MOLOKO is the analysis of quality characteristics and contaminants in milk. For this purpose the chip is combined with a nanostructured plasmonic grid provided with specific antibodies. The milk to be tested is passed over the chip via a microfluidic system. The OLED-OPD platform measures the change in reflectivity of the plasmonic grid. The measuring principle can also be applied to medical applications or environmental analysis. In addition, an OLED-OPD platform offers the possibility to evaluate fluorescence signals by using dye markers.

4 Spectral sensitivity of the OPDs



5 OLED emission spectra (examples)



Chip
Size: 27 mm × 35 mm
Material: glass
OPD sensitivity 300 nm … 850 nm
OLED emission 450 nm … 780 nm

Chip version 1 & version 4
7 OLED stripes / 8 OPD stripes

Chip version 2
2 OLED stripes / 2 OPD stripes

Chip version 3
15 OPD stripes

2-3 *OLED-OPD chip (version 1). One OLED switched on (green OLED).*