Personalized cosmetics: a low-hanging fruit for printed biosensors: Page 2 of 4

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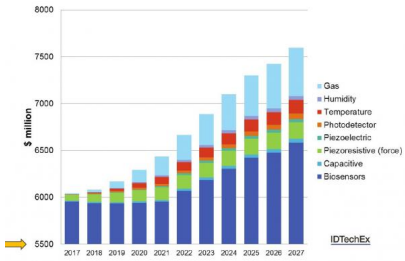

Although AFELIM members gathered in Paris under the general theme "printed sensors", the focus was clearly on biosensors during the "Rencontres électronique imprimée".

In an experimental setup, the researcher and his team were able to characterize 400 sensors (with different compositions) held in a tiny controlled cylinder, in less than a minute. The researchers used doped polyaniline (PANI) and PANI/TiO_2 hybrid nanocomposites to detect ammonia levels between 0.2 and 30ppm, with a quantification limit at about 10ppb. Further investigation showed that the response of the hybrids (blending TiO_2 nanoparticles with the conductive doped polyaniline are 10 or 35 times superior than the pure form of doped PANI.

This was due to the formation of p-n heterojunctions at the PANI TiO_2 nanoparticle interfaces, Wojkiewicz explained. The sensors boast fast response and recovery times (fully reversible when fresh air is restored). For the low-cost and non-toxicity aspect, the researcher turned to blending PANI with Chitosan, an abundant and biodegradable polymer found in crustacean shells. Sensors built with the new blend offered a good response to ammonia too.

Since the polyaniline can be doped to respond to different gas, sensors can be fabricated to detect known disease biomarkers in breath, providing non-invasive screening tools to diagnose a disease at an early stage. Wojkiewicz cited renal diseases as being characterized by an increase of ammonia concentration in breath, but the single-digit ppm variations that differentiate a healthy subject from an unhealthy one require the design of multiple sensing layers and further characterization, with new signal processing algorithms. Wojkiewicz expects to see his results published in the Sensors and Actuators B: Chemical journal. In future investigation, the researcher hopes to be able to apply his biosensors to the early detection of lung cancer, breast cancer and even neurological diseases.

"We are undergoing a patenting process, but there is still a lot of work to do before this can be commercialized" admitted Wojkiewicz. Again the researcher emphasized that such sensors could be designed to detect hundreds of different pollutants, some of which may be carcinogenic. In a research collaboration with car maker Peugeot, the Wojkiewicz and his team were tasked to monitor VOCs in new cars. "Generally when it smells of new, it is bad news for your health" he concluded jokingly.

previous 1 2 3 4 next

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