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Environmental Sensors on CMOS technologies

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Abstract :

Smart Sensors are crucial technological building blocks for a wide range of applications including information technologies, automotive, industrial systems, health monitoring and environmental quality monitoring. In the context of connected objects in the area of Internet of Things (IoT) [1], ultra-low-power sensors integrated on CMOS is an interesting option for Wireless Sensor Nodes (WSN) for real-time environmental quality monitoring [2], [3].

In this talk, we present the interest of Fully Depleted Silicon On Insulator (FDSOI) technologies for sensing applications. After a description of pH sensors (ISFETs) integrated on industrial 28 nm FDSOI CMOS [4], we present recent advances on sensing materials for environmental sensors for air and water quality monitoring. For air quality monitoring, we present low-temperature operation of NO₂ resistive sensors based on SnO₂ sensing layers and low-temperature operation of CO₂ capacitive sensors based on hybrid polymers (PEI + SiO₂ NPs) sensing layers. For water quality monitoring we present the fabrication process of ion sensing membranes (ISM) selectively sensitive to ammonium (NH₄⁺) and nitrates (NO₃⁻) ions polluting ionic species. Functionalization of the ISM are performed by adding ionophores of interest for each studied pollutant.

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