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# Towards Autonomous Smart Sensors Systems on CMOS technologies for real time environmental quality monitoring.

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**Key words:** IoT, Smart Sensors, environmental sensors, CMOS

## **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 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]. Indeed, the combination of ultra-low power and ultra-sensitive and technologies combined with communications technologies offers a real advantage for autonomous System on Chip (SoC) sensing solutions. This approach opens the way to the integration of extremely small sensors with a possibility of multiple sensing by matrix approach for electronic noses.

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 platform [4] we present recent advances on sensing materials for environmental sensors for air and water quality monitoring. For air quality monitoring we present sensing properties at low temperatures of metal oxides (SnO<sub>2</sub>) and hybrid polymers (PEI + SiO<sub>2</sub> NPs) for NO<sub>2</sub> and CO<sub>2</sub> detection respectively. For water quality monitoring we present the fabrication process and sensing properties of ion sensing membranes (ISM) selectively sensitive to ammonium (NH<sub>4</sub><sup>+</sup>) and nitrates (NO<sub>3</sub><sup>-</sup>) ions polluting ionic species. Functionalization of the ISM have been performed by adding ionophores of interest for each studied pollutant.

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