A materials view of the "Internet of Things" opportunity

Carlos Mazure
Soitec, Bernin, France

The IC industry has continuously reinvented itself. The technology drivers have changed from being computer-centric to smart-handheld-centric. The next big change will be the "Internet of Things" or IoT. It will be the next important inflection point of the electronics market, enabling a huge number of applications that will, in turn, challenge the existing business models, and the Internet infrastructure. The IoT products will be a collection of sensors with some amount of computing and memory storage, powered by a long-lasting energy source, and connected to other smart things or to the Internet.

Behind this IoT opportunity we will find "More than Moore" technologies, clever material processes and engineered substrates. In the RF world, engineered substrates have already become mainstream with more than 80% of smart phones having RF front-end module (FEM) devices build on RF-SOI substrates. Wafer level layer transfers are enabling new imagers, such as backside-illuminated imagers fabricated via a thin film transfer of the originally processed layer onto a new substrate. Movement sensors, photonic devices use tailored SOI substrates to their advantage.

The industrialization of SOI with nm-thin Si and buried oxide (BOX) layers has enabled low-cost, low power ICs. Ultra-thin Si and BOX SOI make possible fully depleted (FD) CMOS technologies with low V_{DD} operation without significant performance loss. It reintroduces back-biasing design techniques that enable dynamic management of IC blocks from very high performance to ultra-low standby leakage. Since FD CMOS builds on planar MOSFETs, it extends the applicability of bulk design flows with existing design and EDA tools, particularly for mobile and low-power CMOS technologies.

This presentation will discuss the contributions and benefits of engineered substrates solutions and thin layer transfer technologies, focusing on applications in the mobile and IoT space.