Scientific Tracks - Day 1

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Spin-Coated PbS quantum dot based photodiodes patterning challenges and their integration into Si imagers

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he integration of infrared sensitive thin-film materials with solution processing capabilities on top of Si substrates is a significand step towards cost-efficient infrared imagers. Colloidal quantum dots based on lead sulphide are very attractive materials for the realization of novel image sensors combining low cost synthesis and processing, deposition over large area and on any substrate. The tuneable band gap enables selective detection in wavelengths ranging from the visible up to the short-wave-infrared (SWIR). Patterning of those layers that combine the quantum dots and their ligands is a present challenge. Methods including lift-off, selective deposition or etching depend on the layer deposition technique. This work describes a roadmap that will enable the integration of quantum dot photodiodes (QDPD) on top of a Si based CMOS read-out circuit. In addition, the different patterning methods are discussed, and its use on thin-films stack is introduced (showing the feasibility of pixel pitch of 40µm). Dry and wet etching solutions are presented, as well as comparing how the kind of ligands, in the quantum dots, can change the process requirements and methodology. Photodiodes using an n-p junction architecture were fabricated on Si substrates by spin coating as a successful example using the discussed techniques

Biography: Experience researcher. Field close related to the semiconductors industry and research areas in microelectronics for sensors and MEMS. He obtained his PhD in Applied Science at the Université catholique de Louvain, Belgium, emphasizing his work on microelectronic biosensors. Worked in research at the Université catholique de Louvain, focusing its work in biosensors, gas, pressure and optical sensors. Worked in different industrial projects with companies like Samsung, Canberra and vivaMOS, helping in process integration, quality improvement and validation for image and gas sensors. Currently working in the process development and characterization for thin film photodiodes in the IR light applications at IMEC, Belgium

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