Molecular Surface-cooperative-hybridization: an innovative approaches for Nucleic AcidsDetection

Salvatore Petralia
STMicroelectronics stradale primosole, 50 95121 Catania (Italy)

An innovative chemical strategy based on cooperative hybridization was developed for sensitive detection of nucleic acids without amplification step. An extensively molecular dynamic study was performed to prove that the sequences-gap between the specific two probes is the keystone for the effectiveness of the surface-cooperative-hybridization approach.

The strenght of this strategy was successful proven by integration on miniaturized electrochemical silicon device and on CNTWs based devices. The first electrochemical device contains three planar metal microelectrodes, there the surface cooperative hybridization was succsessfull interrogated by electrochemical measurements through an Osmium based intercalative probe (probe [Os(2,20-bipyridine)(dipyrido[3,2-a:2′,3′-c] phenazine)])Cl_2).

While the surface-cooperative-hybridization for CNTWs based device was proven by electrical measurements.

The results show for the detection of pathogen HBV genome a limit of detection comparable to the standard qRT-PCR method, in particular for the electrochemcial device a LoD of about 20 copies per reaction was obtained. The cross reactivity tests were performed using unspecific genome.

All this finding data paving the way to future development of genetic PoC devices addressing automatized and low-cost molecular diagnostics