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Microelectronic sensor for DNA analysis

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Label free sensing of DNA hybridization has impact in many fields of diagnostic; here the issue of diagnosing chromosome translocations is addressed. Chromosome translocations are often linked to the onset and progress of cancer. Their fast and reliable detection is crucial for the treatment and prognosis of the patient. Current detection methods are based on specific labeling of metaphase or interphase chromosomes fixed on a glass slide with fluorescently labeled DNA probes (fluorescent in situ hybridization- FISH). Several efforts towards miniaturizing cytogenetic techniques such as FISH have been made in recent years.

In this presentation two label-free detection methods of chromosome translocations based on sensing of DNA hybridization on the sensors surface and compare the methods.A biological nanoscaled field effect transistor (BioFET) fabricated in polysilicon is tested and compared to electric impedance spectroscopy on gold microelectrodes. The immobilization of the DNA probe on the two surfaces is first achieved, then the translocation is mapped by the following procedure; the target DNA is initially hybridized to one sensor surfaceand the signal recorded, with probes targeting the sequence of one of the chromosomes involved in the translocation. Then the captured target DNA is heat denatured and transferred to the second sensor with probes now targeting the other chromosome involved in the translocation. Again the change in impedance is recorded. An impedance change on both chips is an indication of successful hybridization to both immobilized probes and thus the presence of a translocation.

Biography

Winnie E Svendsen completed her master's degree with honors in 1993 from the University College Dublin. She received her doctorate in atomic physics in 1996 from Copenhagen University, Denmark. Thereafter she was a postdoctoral position at the Max Planck Institute for Plasma physics, Garching, Germany. She returned to Denmark in 1998 and was appointed Associate Professor at CopenhagenUniversity in 1999. Since 2001 she has been at the Danish Technical University. In 2006 she established her own research group Nano Bio Integrated Systems (NaBIS) applying micro and nanotechnology within biomedical applications. She has more than 70 publications in international journals.

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