Ultrasensitive biosensor for the detection of hepatitis C virus

CSIC, International Iberian Nanotechnology Laboratory (INL), Instituto Nacional de Técnica Aeroespacial (INTA) and Universidade do Minho have developed a graphene field-effect transistor (G-FET), aptamer-based biosensor for the ultrasensitive detection of hepatitis C virus.

Industrial partners from biotech and pharma industry are being sought to collaborate through a patent licence agreement.

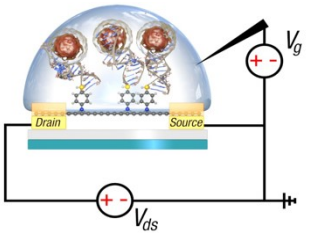
An offer for Patent Licensing

Quick and ultrasensitive detection of a major human pathogen

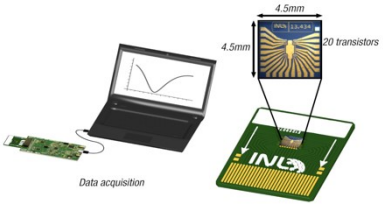
Hepatitis C virus (HCV) affects 115 million people on five continents (2-3% of the worldwide population) and about 350,000 infected individuals die every year due to complications derived from hepatitis C.

Currently, the diagnosis of HCV infection is performed by means of immunologic tests (ELISA) or antigenic tests. Nevertheless, they can give false negatives and a confirmation by PCR is required.

In general, biosensors useful in the clinical practice contain biomolecules or artificial compounds as probes that specifically capture either target biomolecules of a given pathogen (such as enzymes, structural proteins or DNA), or the antibodies produced by the immune reaction of the infected host. Among the molecular probes used in biosensors, nucleic acid aptamers offer a number of advantages over antibodies. Using in-house produced DNA aptamers, we have developed a graphene field-effect transistor (G-FET) aptasensor that specifically detects HCV core protein of genotypes 1 to 4 up to attomolar concentrations (10^{-18} M) in human blood plasma.



Scheme of the G-FET biosensor



Easy and quick detection process

Main innovations and advantages

- The high affinity and specificity of the aptamers used (developed by our group) and the robustness of our particular fabrication method:
  - lead to an extremely high sensitivity in the detection levels, in attomolar regime in human blood plasma, which ensures a fast and clear detection of the virus,
  - results in the specificity of the detection for HCV,
  - allows reuse of the biosensor, which is a clear advantage over the antibody-based diagnosis platforms.
- The specially modified G-FET used in the device exhibits high stability over time and temperature.
- This protocol can be easily extended to the detection of other viral or bacterial pathogens.

Patent Status

European priority patent application with suitable for international extension

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