Sensing traces of nerve agents like Sarin using nanomaterial based electrical detectors

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The threat of a chemical attack on homeland and military forces continues to grow and examples such as the terrorist attack of the metro of Tokyo, or the recent use of chemical warfare agents in Syria, have clearly shown that organophosphorus agents (OPs) are powerful neurotoxic molecules that can actually be used as weapons of chemical terrorism.

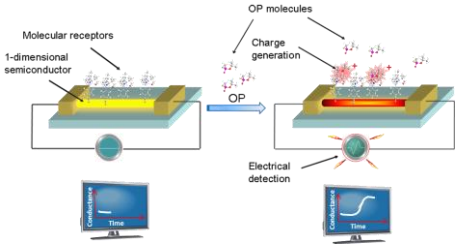
Some sensors are commercially available to detect toxic agents, however they suffer from some intrinsic defects that reduce significantly their interest in some specific kinds of operation. Up to now, there is still a lack of supersensitive and specific autonomous small sensors.

New sensors based on one-dimensional semiconducting nanomaterials like silicon nanowires have been chemically functionalized with tailor-made molecules for detection of traces of toxic gases. In particular, a chemical receptor specific to traces of neurotoxic OPs like Sarin has been synthesized and grafted to nanomaterial based electrical devices.[1]

These results show that it is possible to detect very efficiently sub-ppm traces of OPs with high selectivity by functionalized field-effect transistors.

In this presentation we will show results starting at the nanoscale using functionalized nanomaterials, up to their integration in an autonomous demonstrator and tests with real Sarin.

Figures



References

[1] Angewandte Chemie Int. Ed., 2010, 49,4063; IEEE Electron Device Letters, 2011, 32(7), 976-978; Chemical Communication, 2011, 47, 6048-50; Talanta, , 2011, 85, 2542-2545 ; 3 Patents to CEA