

Selective Molecular Sensing using CMOS Compatible Nanowire Transistor

Yossi Rosenwaks

*Faculty of Engineering, Tel-Aviv University,
Email: yossir@eng.tau.ac.il Web: <https://english.tau.ac.il/profile/yossir>*

Abstract

For the past several decades, there is a growing demand for the development of low-power gas sensing technology for the selective detection of volatile organic compounds (VOCs), important for monitoring safety, pollution and healthcare. We present the selective detection of various VOCs using the electrostatically formed nanowire (EFN) transistor without any surface modification of the device. Selectivity towards specific VOC is achieved by training machine-learning based classifiers using the calculated changes in the threshold voltage and the drain-source on current, obtained from systematically controlled biasing of the surrounding gates (junction and back gates) of the field-effect transistors (FET). Specific biasing of the device has recently shown superb sensitivity to Ammonia and other molecules under very high humidity conditions. This makes the EFN platform a selective sensor, working under ambient conditions and room temperature, which is suitable for mass production and low-power sensing technology.

Short Biography

Prof. Yossi Rosenwaks, Dean of the Faculty of Engineering, and the founder of Tel Aviv University's Center for Renewable Energy, has been a professor of electrical engineering at TAU since 2005 after joining the faculty in 1996. Prof. Rosenwaks leads a research group of 10 graduate students and scientists, and his current research interests include nanowire transistors and sensors, two-dimensional materials and devices, and charge carrier dynamics and transport in semiconductors. Prof. Rosenwaks is a co-author of more than 170 peer reviewed articles, and has presented 70 invited talks at international meetings.

He served as the president of the Israel Vacuum Society (2003-2006), and as the director of TAU's Wolfson Center for Applied Materials Research and Gordon Center for Energy Studies (2005-2008), and the head of the Physical Electronics department 2011-4.

