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How to improve the sensitivity in transverse electronic measurements of DNA for nucleobase distinction? YUHUI HE, MING LIU, Institute of Microelectronics, Chinese Academy of Sciences, Beijing, China, ANTON GRIGORIEV, RALPH H. SCHEICHER, Cond. Mat. Theory Group, Dept of Physics and Astronomy, Uppsala University, Sweden, RAJEEV AHUJA, CMT Group at Uppsala; Dept of Mat. Sci. and Eng., Royal Inst. of Tech. (KTH), Stockholm, Sweden — In an attempt to realize third-generation whole-genome sequencing technologies, nanopores have been at the center of the research focus. Key issues with this approach involve how to slow down the translocation speed of DNA and how to achieve single-base resolution. We have previously proposed [arXiv:0708.4011; J. Phys. Chem. C 112, 3456 (2008)] the use of functionalized nanopore-embedded gold electrodes to address both these issues. More recently, we demonstrated [Appl. Phys. Lett. 97, 043701 (2010)] through molecular dynamics and electron transport simulations that the transverse differential conductance of a translocating DNA may allow for distinction between the four bases and can withstand electrical noise caused by DNA structure fluctuations. Our findings demonstrate several advantages of the transverse conductance approach, which may lead to realistic applications in rapid genome sequencing.

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