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**Functionalizing a nanopore with nano-electrodes for control of the translocation of DNA with single base resolution**[1] HONGBO PENG, STANISLAV POLONSKY, GUSTAVO STOLOVITZKY, STEPHEN ROSSNAGEL, Thomas J. Watson Research Center — Recently, application of nanopores to low-cost DNA sequencing has attracted great interest as there is great need to reduce the cost of sequencing a whole human genome to $1000. A key issue in the field of nanopore DNA sequencing is to control the DNA translocation. Here we will report the development of what we call a DNA transistor: a nanopore-based electrical device for controlling the translocation of DNA with single base resolution. The key part of this device is a free standing membrane, within which multiple layers of electrically addressable metal electrodes separated by dielectric layers are embedded. A 1-5 nanometer size pore is made through the membrane. We demonstrated that such a device is electrically viable for the electrode layer or the spacing dielectric layer as thin as 3 nm. Confirming the basic function of the device, induced electrical signals on the nano-electrodes by the translocating DNA, as well as the modulation of DNA translocation speed by the voltage bias applied on the nano- electrodes are also observed. Our ongoing experiments test if the modulated electrical field can trap or translocate DNA at a single base resolution.

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