MAR05-2004-005324

Abstract for an Invited Paper
for the MAR05 Meeting of
the American Physical Society

Silicon Nanopore Devices for DNA Translocation and Sequencing Studies

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In this talk, I will discuss the recent progress [1-3] in developing solid-state nanopore devices using silicon technology. We have demonstrated a novel technique for shaping nanopores in the range of 1-10 nm, using surface-tension-driven mass flow with single nanometer precision. This technique overcomes a major technical challenge in silicon technology. I will also discuss the current effort [3] in developing integrated nanopore silicon chips with electrically addressable nanopores. These devices are used for DNA translocation and sequencing studies. This work was done in collaboration with the group of Cees Dekker at TU-Delft with partial support from FOM and Guggenheim Foundation. The work at Brown was supported by NSF-NER and NSF-NIRT.

[1] A.J. Storm, J.H. Chen, X.S. Ling, H. Zandbergen, and C. Dekker, "Fabrication of Solid-State Nanopores with Single Nanometer Precision", Nature Materials, 2, 537 (2003).
[2] A.J. Storm, J.H. Chen, X.S. Ling, H. Zandbergen, and C. Dekker, "Electron-Beam-Induced Deformations of SiO2 Nanostructures", Journal of Applied Physics (submitted, 2004).
[3] X.S. Ling, "Addressable nanopores and micropores" (patent pending).