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# Ultrafast and Wide Range Analysis of DNA Molecules Using Tunable Rigid Network Structure of Solid Nanowires

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Analyzing sizes of DNA molecules via electrophoresis using a soft gel has played an important role in the recent, rapid progress of biology and biotechnology. Although analyzing DNA molecules over a wide range of sizes in a short time is desired, none of the existing electrophoresis methods has been able to fully satisfy these two requirements. Here we propose a novel method using a rigid 3D network structure composed of solid nanowires within a microchannel. This rigid network structure enables analysis of DNA molecules under applied DC electric fields for a large DNA size range (100 bp-166 kbp) within 13 s, which are much wider and faster conditions than those of any existing methods. The network density is readily variable for the targeted DNA size range by tailoring the number of cycles of the nanowire growth only at the desired spatial position within the microchannel. The rigid dense 3D network structure with spatial density control plays an important role in determining the capability for analyzing DNA molecules. Since the present method allows the spatial location and density of the network nanostructure within the microchannels to be defined, this unique controllability offers a new strategy to develop an analytical method not only for DNA molecules but also for other biological molecules.

**Reference**

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