

FIELD-EFFECT APPARATUS AND METHODS FOR SEQUENCING NUCLEIC ACIDS

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BACKGROUND

10 This disclosure relates generally to biosensor-based detection, and more
specifically to biosensors that can be used for nucleic acid sequencing.

Currently available commercial platforms for sequencing DNA are relatively
costly. The majority of these platforms use a 'sequencing-by-synthesis' approach, so
called because DNA polymers are synthesized while detecting the addition of each
15 monomer (i.e. nucleotide) to the growing polymer structure. Because a template DNA
strand strictly directs synthesis of a new DNA polymer, one can infer the sequence of
the template DNA from the series of nucleotide monomers that were added to the
growing strand during the synthesis. Monitoring the reaction uses relatively expensive
hardware such as lasers, detection optics and complex fluid delivery systems. The most
20 successful commercial platforms to date also require expensive reagents and hardware
to amplify the DNA templates before sequencing-by-synthesis can even begin. The
complexity and expense of these platforms has hindered their use in some clinical and
research contexts where there is a clear need for DNA sequencing technology.

Thus, there exists a need for improvements to nucleic acid sequencing platforms
25 to make them more cost effective, rapid and convenient. The present disclosure
addresses this need and provides other advantages as well.