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Determining the Detection Speed Limits of Nanobiosensors[1]
MATTHEW LEYDEN, Oregon State University Physics, CANAN SCHUMAN, JOSH KEVEK, ETHAN MINOT, MINOT RESEARCH GROUP TEAM —
Nanoscale field-effect transistor (FET) biosensors are a promising candidate for fast, label-free, multiplexed detection of protein biomarkers in blood and other liquids. The fundamental limits of nanobiosensor detection speed have been explored in recent theoretical investigations. To realize these fundamental limits, the surface area where protein binding occurs must be shrunk to nanoscale dimensions. Our experiments test these predictions by studying the adsorption kinetics of proteins delivered to a carbon nanotube FET biosensor via a microfluidic channel. We demonstrate that protein flux has a linear dependence on protein concentration and show that detection times can be improved by shrinking the binding area of the sensor.

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Matthew Leyden
Oregon State University

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