# A Portable and Cost-Effective Immunoassay Based Diagnostic Tool with Electrical Sensing

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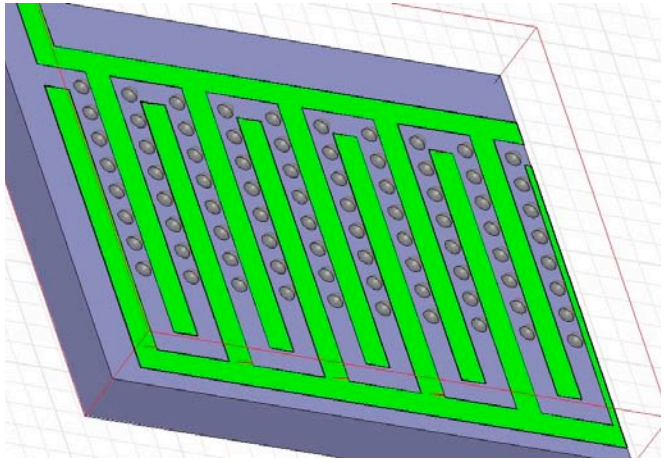
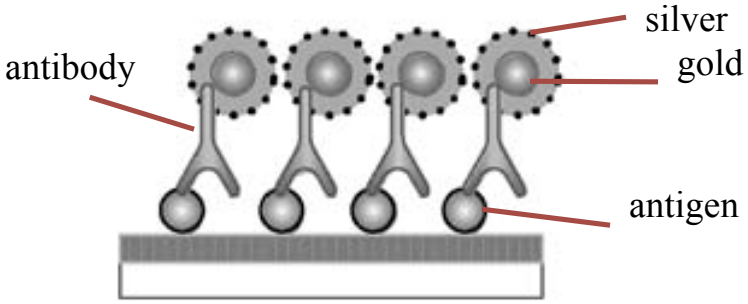
Inexpensive diagnostic tools are crucial in developing countries with limited medical resources. Immunoassays, such as the commonly used enzyme-linked immunosorbent assay (ELISA) method, are a reliable way to diagnose infectious diseases. Unfortunately, ELISA requires costly and cumbersome instruments, optical detection, long incubation periods, and many laboratory steps. An immunoassay that is portable, cost-effective, quick, and easy to use could be widely applied in resource-poor countries, detecting biological warfare agents, and point-of-care diagnostics.

We present preliminary work towards a battery powered diagnostic tool that can be operated with minimal technical skills. Detection of specific molecules is performed with antibodies similar to ones used by the human immune system. By attaching these antibodies to gold nanoparticles, then enlarging them with silver, the molecule of interest is electrically detectable. We are working towards creating a hand-held sensor by realizing this concept in microfluidic channels and microlelectronics.



A close up model of the sensing electrodes with silver particles.




Gold-antibody complexes attach to the antigens under detection.

*Supported by NSF DMR-0649199*