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Field-Friendly Tuberculosis Biosensor NATHAN PROPER, JEREMY STONE, Electrical Engineering, KRISTEN L. JEVSEVAR, School of Biomedical Engineering, MICHAEL SCHERMAN, MICHAEL R. MCNEIL, Department of Microbiology, Immunology and Pathology, DIEGO KRAPF, Electrical Engineering — Tuberculosis is a fading threat in the United States, but in the developing world it is still a major health-care concern. With the rising number of cases and lack of resources, there is a desperate need for an affordable, portable detection system. Here, we demonstrate the feasibility of a field-friendly immunological biosensor that utilizes florescence and specialized surface chemistries. We observe fluorescently labeled antibodies as they bind to a glass slide. Slides are treated with biotinylated polyethylene glycol to inhibit non-specific interactions and facilitate the binding of primary antibodies allowing for a high degree of specificity. Solutions of tuberculosis-specific antigens where mixed with fluorescently labeled secondary antibodies and incubated on the treated surfaces. An array of different concentrations of antigens bound to fluorescent tags is then read in an epifluorescnece microscope. This assay was used in the portable detector to show that higher concentrations of bound labeled antigens produce a greater emission when excited by a HeNe laser. Home-built electronics, off-the-shelf optics, and a Si photodiode (PD) were used. The data collected from multiple concentrations show a measurable photocurrent. Work is now underway to incorporate a avalanche (PD), flow-cell technology, in a portable box.

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