Effective diagnostic tests for infectious diseases such as tuberculosis (TB) are critical for patient care and global infection control. Many diagnostic tests, however, have poor sensitivity and speed. The proposed technologies combine diagnostic testing, reagent design, high speed sample manipulation, and nanometric materials to create the next generation of detection techniques and instrumentation. Originally designed to identify lipoarabinomannin, a marker of TB, this invention facilitates identification of various infectious diseases in immunoassays with a lower limit of detection, which enables earlier disease diagnosis. Analytes in a sample could be captured and labeled using a membrane with multiple flow channels. The amount of captured analyte would then be determined visually by comparing the developed color to a standard chart. A new method for pretreating samples using a rapid, temperature-insensitive approach eliminates the need for heat inactivation prior to testing and enables point-of-need diagnostics. Additional advances streamline and improve microassay and surface-enhanced Raman spectroscopy (SERS) tests, by decreasing coffee rings that affect analyte detection and increasing SERS signal intensity.

**FEATURES AND BENEFITS**
- Facilitates rapid, semi-quantitative diagnosis of infectious diseases.
- Enables visual or digital reading for use in resource-limited settings.

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