

## NANO HIGHLIGHT

### Improving Nanoparticle-based Biosensing

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Nanoparticles used in biosensing are tailored to attract specific biological molecules through the use of surface chemistry. Because the entire detection device is small, portable, inexpensive, and simple to use, these nanoparticle biosensors make a promising detection platform. However, the rapid detection of multiple analytes simultaneously can make implementing such biosensors challenging; this is especially important in disease diagnostics of complex biological fluids, such as blood, which may contain many biological molecules of interest.

These NU-NSEC researchers are exploring two avenues which should enable the simultaneous measurement of large numbers of analytes interacting with nanoparticles on a surface. First, patterned surfaces in which different biological molecules of interest interact with discrete areas of the surface were fabricated. These surfaces were then imaged over a large area to include the detection of many areas of interest in one measurement. Second, the ability to tailor individual nanoparticles to bind specific biological molecules and image many of these nanoparticles at once allowed for greater multiplexing capabilities; this avenue is particularly exciting because single nanoparticles show increased sensitivity to biological binding events. In addition, devices containing individual nanoparticles are considerably smaller than those with fabricated surfaces because only one nanoparticle is required for a measurement. Current applications for this technology include the detection of multiple biomarkers for Alzheimers' disease and drug screening of cytochrome P450 protein, an important component in the metabolism of toxic compounds in the liver.

