UMBC Department of Chemical, Biochemical and Environmental Engineering Seminar Series presents:

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New approaches to lateral-flow immunoassays: What's inside that home pregnancy/flu/chlamydia test?

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12:00pm—12:50pm

Performing Arts and Humanities, Room 132

ABSTRACT

Lateral-flow assays (LFAs) are fast, inexpensive and simple point-of-need diagnostic tools which detect targets such as pathogens, drugs, and hormones - the home pregnancy test is the best-known application of LFA technology. In LFA, a liquid sample wicks by capillary action along a porous membrane, typically of nitrocellulose or paper. Analyte-specific recognition elements, e.g. antibodies, aptamers or DNA probes, are immobilized on the membrane in analyte capture test lines. Reporter particles bearing capture antibodies holding analyte (if present) are captured on the test line to produce a visible. Gold nanoparticles, colored latex particles, carbon nanoparticles, fluors or magnetic particles are used as reporters.

LFA is a very useful technology, and usually is the method of choice when it is capable of the needed analytical performance. For some applications, however, LFA lacks sufficient analytical sensitivity or accuracy of quantitation. To address these limitations, we have been investigating the fundamental mechanisms of LFA, and developing improved LFA reporter particles based on enzyme-bearing phage virus particles, and phosphorescent nanoparticles. Enzyme-phage show dramatically-improved sensitivity compared to conventional reporter particles, though they require the addition of enzyme substrate as an added step. We also recently recently introduced persistent-luminescence nanophosphors made from common "glow in the dark" strontium aluminate materials. These are 20-100 times as sensitive as conventional reporter particles when used with a simple smartphone accessory and app that activates the phone flash, then promptly acquires a camera image. Nanophosphor LFAs also show promise for quantitative assays.