Effects of biological compounds on silica gel- polydiacetylene monolayer biosensor

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We aim to create stable and sensitive biosensor for detection of pathogenic microorganisms at the early stages of their proliferation. For this purpose we designed a polydiacetylene (PDA) assemblies interspersed within tetraethyl orthosilicate (TEOS) to create a gel monolayer at the air/water interface. Diacetylene films, cross-linked by UV irradiation, have been shown to exhibit unique chromatic properties: the polymer appears intense blue due to the ene-yne conjugated framework. Furthermore, PDA undergoes chromatic and fluorescence changes induced by external structural perturbations, such as binding of positively charged ions and molecules or amphiphilic compounds.

The morphology and organization of the PDA/TEOS gel films have been characterized by Brewster angle microscopy (BAM), surface pressure measurements, atomic force microscopy (AFM), and scanning electron microscopy (SEM). Fluorescence microscopy, light microscopy, and colorimetric analysis were applied in order to examine the sensitivity of the gel monolayer to bacteria [1, 2] and various pharmaceutical compounds. Our results demonstrate that rapid detection of pathogenic strain of Salmonella can be obtained, starting only from three hours of bacterial growth. This work shows that the sensor exhibits reliable and versatile platform for rapid reporting on bacterial presence.

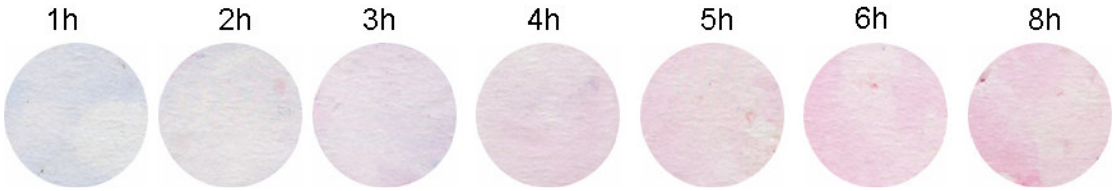

Figure 1
Color change of PDA\TEOS gel monolayer as a function of exposure to proliferating bacteria

[1] Silbert, L.; Ben Shlush, I.; Israel, E.; Porgador, A.; Kolusheva, S. and Jelinek, R. Applied and Environmental Microbiology **2006**, 72, 7339–7344.
[2] Meir, D.; Silbert, L.; Volinsky, R.; Kolusheva, S.; Weiser, I. and Jelinek, R. Journal of Applied Microbiology **2008**, 104, 787–795.