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Label-free detection of DNA on silicon surfaces using Brewster angle straddle interferometry (BASI) XIAO WANG, University of Rochester School of Medicine and Dentistry, Department of Biochemistry and Biophysics, 601 Elmwood Ave., Box 712, Rochester, NY, 14642, LEWIS ROTHBERG, University of Rochester, Department of Chemistry, Rochester, NY 14627 — Label-free sensing of biomolecular interactions is of great importance for drug screening and a variety of clinical assays. Ultrasensitive detection of dsDNA on silicon substrates can be achieved using our new label-free sensing method - Brewster angle straddle interferometry (BASI) which exploits the removal of destructive interference to detect binding of target molecules on a silicon surface functionalized by probe molecules. By exploiting the fact that reflections of p-polarization undergo 180 degree phase shifts above the Brewster angle and none below it, we are able to use unprocessed silicon substrates with native oxide serving as the interference layer. Destructive interference in the geometry we use results in reflectivities $\sim 0.01\%$. Reflectivity from the chip is a quantitative measure of the amount of bound target molecules and can be imaged in real time in microarray format. We demonstrate detection of DNA intercalation on pyrene modified surfaces. The substrates are shown to exhibit excellent binding toward dsDNAs. This work provides an avenue for understanding the binding specificity of small molecule-DNA interactions that can be potentially helpful in developing anticancer agents.

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