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Improved Biomolecular Thin-Film Sensor based on Plasmon Waveguide Resonance[1] COURTNEY BYARD[2], MUSTAFA ASLAN, SERGIO MENDES, University of Louisville Department of Physics and Astronomy — The design, fabrication, and characterization of a plasmon waveguide resonance (PWR) sensor are presented. Glass substrates are coated with a 35 nm gold film using electron beam evaporation, and then covered with a 143 nm aluminum oxide waveguide using an atomic layer deposition process, creating a smooth, highly transparent dielectric film. When probed in the Kretschmann configuration, the structure allows for an efficient conversion of an incident optical beam into a surface wave, which is mainly confined in the dielectric layer and exhibits a deep and narrow angular resonance. The performance (reflectance vs. incidence angle in TE polarization) is modeled using a transfer-matrix approach implemented into a Mathematica code. Our simulations and experimental data are compared with that of surface plasmon resonance (SPR) sensor using the same criteria. We show that the resolution of PWR is approximately ten times better than SPR, opening opportunities for more sensitive studies in various applications including research in protein interactions, pharmaceutical drug development, and food analysis.

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