# Fabrication And Characterization Of Microwave Immunosensors Based On Organic Semiconductors With Nanogold-labeled Antibody.

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## Abstract:

Microelectronic biosensors hold great promise for rapid, sensitive and specific in vitro point-of-care immunodiagnostics. In particular, sensors fabricated using organic semiconductors have attractive advantages-such as ease of manufacture and low cost-in the design and implementation of such devices. Furthermore, immobilization of an antibody or protein antigen as a biorecognition element onto an organic semiconducting film allows for direct transduction of biomolecular binding events into an electronic signal which is readily measured and processed. In previous work, we have demonstrated that an antigen can be bound to organic semiconducting films while retaining enzymatic activity after immobilization. The present work considers organic semiconducting films which are spin-cast onto an interdigitated electrode; antibodies labeled with gold-nanoparticles are applied to the organic semiconducting film and serve as a biorecognition element. The sensor geometry includes a high-frequency coplanar waveguide contact metallization to facilitate direct measurement using microwave wafer probes. Equivalent circuit models are derived from microwave measurements over the frequency range 0.3 MHz to 8.5 GHz.