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**Characterization of a nanospring-based biosensor by ac impedance spectroscopy** Y.P. TIMALSINA, D. ORIERO, G. CORTI, J. BRANEN, E. ASTON, K. NOREN, J. NAGLER, S. RASTOGI, D.N. MCILROY, Dept. of Physics, University of Idaho, Moscow, ID 83844 — In this study, a process for developing nanospring-based electrical biosensors is presented. Impedance spectroscopy is used to characterize silica ($SiO_2$) nanospring-based biosensors. The sensor is a capacitor consisting of two conducting surfaces with silica nanosprings as the dielectric spacer layer. The nanosprings are grown on glass substrates coated with indium tin oxide (ITO) to form one of the electrodes of the capacitor. The top electrode is an ITO coated glass substrate. Placing one slide on top of the other slide produces a capacitor with nanosprings as the dielectric spacer layer. The initial phase of biosensor development is to characterize the response of the device with an aqueous solution consisting of sodium chloride in a phosphate buffer. The experimental impedance data is analyzed using a model equivalent resistor-inductor-capacitor (RLC) circuit. Analysis of the impedance spectra of the nanospring-based biosensor requires a much more complex equivalent circuit relative to the blank biosensor where nanosprings are not present.

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