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A study of biofunctionalized silica nanospring surface for immunosensor applications YUKTA P. TIMALSINA, DAVID N. MCILROY, University of Idaho — A study of biofunctionalized VANS (vertically aligned (silica) nanospring) surface for immunosensor applications is presented. VANS surface treated with 3-aminopropyltriethoxysilane (APTES) leaves a primary amine groups on the VANS surface. Glutaraldehyde (GA) reacts with APTES modified VANS surface forming imine bonds at one end of glutaraldehyde, leaving aldehyde groups at the other end to react with the antibody. X-ray photoelectron study verifies each step of VANS surface functionalization. A goat anti mouse antibody (GαM IgG I) is immobilized as a biorecognition layer on the APTES-GA modified surface and targeted to mouse IgG. It is investigated that mouse IgG captured from the solution phase specifically binds to goat anti mouse IgG on APTES-GA- GαM IgG I. Then layer of GαM IgG II attached to the APTES-GA- GαM IgG I-mouse IgG surface reacts only when there is mouse IgG instead of rabbit IgG. A modeling of a resistor-inductor-capacitor (RLC) circuit of impedance spectra measured after the addition of successive layer indicates the these biological layers behave as insulating layers. It is explored that there is a greater magnitude of change between successive bio-layers below 10 kHz. Changes in the magnitudes of the elements of the RLC equivalent circuit indicate that the addition of biological layers impedes ionic motion thereby changing the effective dielectric response by the biomolecule polarization.

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