

## Carbon-nanotube-based FR-4 patch antenna as a bio-material sensor

### ABSTRACT

This paper presents the development and design of proximity coupled feed patch antenna as a bio-sensor. This sensor system consists of a two-layer Flame Retardant (FR-4) patch antenna coated with Multi Walled Carbon Nanotubes (MWCNTs) for absorbing bio-molecules. The best design of patch antenna is chosen based on simulation results using Computer Simulation Technology (CST) microwave studio software. After adding bio-material on the top of antenna and interaction with MWCNTs based on the changes in the effective dielectric constant, the resonant frequency of patch antenna is changed. Experimental results have shown 1 MHz change in resonant frequency of patch antenna upon exposure to ethanol. Based on operating frequency (5 GHz) this technique can be used in network sensor systems to measure bio-materials in future research.

**Keyword:** Bio sensor; Patch antenna; Carbon nanotube sensor; Microwave sensor