Title: Multifunctional role of nanoparticles for the diagnosis and therapeutics of cardiovascular diseases

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Abstract: A terahertz (THz) wave technology is very appealing for applications in detection in biomedicine, biological spectroscopy, material characterization, detection, imaging, sensing, and other convenient applications. Metamaterials (MMs) are artificial structures that have structures in a regular periodic arrangement and don't exist in nature. By utilizing a proposed terahertz metamaterial absorber, a broad spectrum of adulterated lubricants can be detected. It is an efficient detection process that enables the development of a THz detection approach by making use of the metamaterial as a sensor. The proposed terahertz absorber is analyzed and optimized using the CST Microwave Studio 2019 software. The article proposed a multiband THz metamaterial absorber with a unit size of 70 μm. According to the demonstrated results, we can achieve five narrow absorption peaks with perfect absorption within the frequency range between (0.2–4.2) Terahertz. Also, the result shows that, the average absorbance of 99.07% at the resonance frequencies of 0.56, 1.42, 2.676, 3.14, and 3.89 THz. The E (electric) and H (magnetic)-field distributions on the resonator at different resonance frequencies were also analyzed as well as. The recommended metamaterial absorber has a good sensing capability at different resonant frequencies, with refractive index sensitivities of 80 GHz/RIU, 240 GHz/RIU, 480 GHz/RIU, 480 GHz/RIU, and 520 GHz/RIU obtained by modifying the refractive index of the sample holder or the analytic layer, respectively. As a result, the proposed detector has a high refractive index sensitivity, high Q-factor, and high FOM, making it suitable for detecting oil adulteration.

Keywords: Cardiovascular disease (CVD); Morbidity and mortality; Nanotechnology; Nanoparticles (NPs); Nanocarriers; CVD diagnostics

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