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# Design and FDTD simulation of photonic crystal based sensor for biosensing applications

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**Abstract**
Photonic crystals (PhCs) is a unique and flexible class of optical devices that are able to manipulate the electromagnetic fields of light. PhCs is a subwavelength grating structure with a periodic arrangement of a high refractive index layer coated on a low refractive index material and can provide a strong light confinement depending on the size, periodicity and the refractive index. Finite difference time domain (FDTD) method can be used to simulate the electromagnetic properties of light through complex structures such as PhCs, because of the precision of the method in the description of geometry and properties of the material. In this study, FDTD software from Lumerical was used to design and simulate the electromagnetic properties of the PhCs based sensor for biosensing applications. The transmission, reflection and absorption characteristics through the proposed PhCs structure was analysed using a visible wavelength range of 400-700 nm. The boundary conditions were correctly chosen and consisted of periodic boundary conditions and perfectly matched layers. The results revealed that the transmission and reflectance were dependent on the period of the PhCs and the enhanced electric field was confined in an area allowing for interaction with biological analytes.