



# **Active Terahertz Metamaterial for Biomedical Applications (SpringerBriefs in Electrical and Computer Engineering)**

*Balamati Choudhury, Arya Menon, Rakesh Mohan Jha*

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This book describes a metamaterial-based active absorber for potential biomedical engineering applications. Terahertz (THz) spectroscopy is an important tool for imaging in the field of biomedical engineering, due to the non-invasive, non-ionizing nature of terahertz radiation coupled with its propagation characteristics in water, which allows the operator to obtain high-contrast images of skin cancers, burns, etc. without detrimental effects. In order to tap this huge potential, it is important to build highly efficient biomedical imaging systems by introducing terahertz absorbers into biomedical detectors. The biggest challenge faced in the fulfilment of this objective is the lack of naturally occurring dielectrics, which is overcome with the use of artificially engineered resonant materials, viz. metamaterials. This book describes such a metamaterial-based active absorber. The design has been optimized using particle swarm optimization (PSO), eventually resulting in an ultra-thin active terahertz absorber. The absorber shows near unity absorption for a tuning range of terahertz (THz) application.

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