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Development of UWB antenna for microwave imaging systems for breast cancer detection

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Microwave imaging is a promising method in biomedical applications such as breast cancer detection due to its good penetration property, non-ionizing and non-invasive nature which has the potential to be a complementary modality to standard mammography. In this paper, an UWB microstrip-fed Vivaldi antenna for microwave imaging systems aimed for early breast cancer detection is presented. The Vivaldi antenna is designed to operate between 8.821 to 22.30 GHz with dimensions of 44.85x25.28 mm that permits good radiation within the frequency range. To achieve UWB performance, Taconic TLC-32 substrate which has relative permittivity of 3.2 has been used to simulate the antenna by using Antenna Magus Software. The simulation results show that the return loss is better than -10dB within the range of 7.143 GHz to 24.60 GHz with the maximum return loss of -37.56 dB at 18.39 GHz. A comparison of performance with various substrates including ROGERS RO4003C, TMM4 and Taconic are also presented in this paper.

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Wireless implant microsystem

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With microfabrication technologies at forefront, the field of life sciences has seen tremendous growth in the area of smart implantable devices. Though miniaturization and microsystems developments progress is important, the challenge of biocompatibility needs to be answered. Biocompatibility poses challenge in material domain and other challenge is towards the communication means where the wireless option needs to be sought. Any microsystem developed needs to be self-sustainable in the means of power generation and data transmission. Current systems are well developed in the microlevel system-built-in features. Focus is towards the power generation and data transmission for the microsystem. With advent of different material combinations, biocompatibility has been studied. The means for communication in terms of data transfer through the antenna has been analyzed. Varied requirements pose the challenge on implant at different depth levels along the biological systems. Implantations at various levels w analyzed with relation to the operating frequencies for interpreting the suitability of radiative devices. The trends and technologies for radiative elements will be discussed focusing on materials and the miniaturization concept. The necessary aspects on implantable devices are considered for sensitivity and reliability aspects.

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