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A new biodegradable organic dielectric substrate for planar antenna design

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Synthesis and experimental analysis of an organic biodegradable Polybutylene succinate (PBS) based dielectric material for microwave application is presented in this paper. Due to the exceptional mechanical and high thermal deformation features, the proposed silica aerogel nanoparticle extracted from rice husk integrated with PBS has become a potential replacement of traditional polypropylene (PP) and acrylonitrile butadiene styrene (ABS). For experimental verification of the proposed biodegradable organic dielectric material, a new dual band yagi-like antenna is presented for Radio Frequency Identification (RFID) reader and Wireless Local Area Network (WLAN) applications. The designed antenna is comprised of $0.17\lambda \times 0.13\lambda$ radiating patch fed a 10 mm long 2 mm wide microstrip line and reduced ground plane. The antenna is fabricated on the proposed copper laminated 1.25 mm thick biodegradable organic dielectric substrate ($\epsilon_r=4.5$). The performance of the prototype was tested in a standard far field anechoic measurement chamber the results show that 27.78% and 23.4% bandwidths with maximum gains of 4.95 dBi and 7.26 dBi have achieved in lower and upper band respectively. Configuration of driving elements, director and the pairs of folded arm between excitation point and the driven element was optimized that reduces the length of driving poles significantly. Nearly stable radiation characteristics with proper impedance matching make the proposed antenna appropriate for universal portable RFID reader with WLAN functionality.

Biography

M Habib Ullah is a Post-Doctoral Research Fellow in the Department of Electrical Engineering at the University of Malaya, where he is an active member of Electromagnetic Radiation and Devices Research Group (EMRD). He has published more than 80 peer-reviewed papers, monographs, and book chapters. He was awarded national and international prizes for his research contributions.

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