

Application of epoxy-barium titanate dielectric composite material towards coaxial antenna design for liver cancer treatment

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ABSTRACT

New cancer treatment has been explored in thermotherapy technology by using coaxial antennas. Coaxial antenna is used to transmit heat energy from power supply to cancerous tissues. High accuracy energy transmission is very crucial in order to ensure less energy is lost to surrounding or reflected back to antenna. High accuracy of transmission could be achieved if the impedance matching between coaxial antenna and cancerous tissue is good. In this work, the impedance of coaxial antenna is changing by tailored the dielectric material of insulator in the coaxial antenna. Newly developed dielectric composite material is used because of the feasibility to change the dielectric properties only by changing the composition of material used. The permittivity of developed composite material based on epoxy resin and barium titanate is 6.8 while the loss tangent is 0.04 which is suitable to be used as insulator in the coaxial structure. Based on simulation result of coaxial antenna, an improvement in transmission coefficient can be observed with the value of return loss is -63.84 dB. This indicates the heat energy is able to be transmitted with only 0.0004% loss.

KEYWORDS

Barium titanate; Coaxial antenna; Dielectric composite material; Dielectric permittivity; Epoxy resin

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