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Barium titanate–silicon elastomer based body coupled antenna for wearable microwave head imaging applications
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Abstract
This paper presents a flexible monopole antenna fed by a coplanar waveguide (CPW) feeding line with a barium titanate (BaTiO3) silicon-elastomer impedance matching layer for microwave head imaging applications. The operating frequency bandwidth of the proposed antenna is 614 MHz which is from 0.475 GHz to 1.089 GHz. In biomedical microwave sensing and imaging applications, the major challenge is the high power loss due to reflection between the body and the antenna due to impedance mismatch. Therefore, the proposed BaTiO3 silicon-elastomer composite is designed to have dielectric property of 20 which acts as an impedance matching layer for the monopole antenna. The proposed antenna has dimensions of 70×30×6 mm. The flexibility of the antenna is provided by the use of the silicon elastomer. It has been shown that the power radiated into an artificial head phantom improved by almost 160% as compared to antenna without impedance matching layer. Moreover, the SAR level is 0.0286 W/kg when 1 mW of power is transmitted, which is well below the limit set by the regulation. This makes the antenna suitable for wearable biomedical applications due to its wideband characteristic and improved power penetration into human head.

Author Keywords
Barium titanate; Biomedical application; Body-coupled antenna; Coplanar waveguide feed; Impedance matching layer

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