Development of a Polyimide-Based Flexible Antenna

Yong Zhou
The University of Texas at Brownsville, Brownsville, TX 78520, USA

Last decade has seen more and more flexible and wearable electronics developed. Research progress in this area has resulted in flexible microelectronic and portable wireless communication design (*Y. Sun & A. Rogers, Adv. Mater., 2007*). In this paper, a flexible microstrip antenna is designed and optimized for biomedical microwave detection applications. Based on the study on medium-dependent wavelength and attenuation constants of various constituents of the human body, an operating frequency band between 3.2 to 8.5 GHz is chosen for the amtenna. The spectrum locates in the non-ionizing radiation, and the hardware is relatively inexpensive. A copper-clad polyimide laminate, Pyralux AP from DuPont, is chosen as the flexible microwave laminate. This material has excellent electrical and mechanical properties, making it ideal for multilayer flex antenna design.

One of the technical challenges is how to balance the flexibility with the satisfactory antenna performance(operating frequencies, return loss, and radiation pattern change due to flex). Microstrip pattern is well designed and tested under different bending angles. The thickness of the laminate has a thickness of 10 mil, with the consideration of flexibility while maintaining fair antenna performance compared to the flat antenna design. Effect of laminate thickness to both flexibility and antenna characteristics is also demonstrated and explained.