Near-Field 1.4GHz Probes for Power Delivery to Deep Tissue Layers

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This paper presents an overview of several near-field body-worn probes operating at 1.4GHz. Possible applications include thermal power reception from deep tissue layers, and heating sub-layer tissue during ablation. Probes are positioned on the skin and are optimized for maximum power transfer to the muscle and minimize absorption by skin and fat.

All probes are design on a high dielectric constant substrate (Rogers6010) for size reduction. Specific examples, shown in Figure include: (a) circular patch with superstrate for field focusing; (b) circular patch with superstrate and shorting-pin for size reduction; (c) array of shorted-pin superstrate patch probes with optimal phase excitation; (d) ring-slot probe with superstrate; (e)flower-shaped superstrate slot probe for increasing effective radiating area; (f) microstrip-fed cross slot probe. Probes (a) and (b) are fabricated and test measurement presented. Probe (c) increases the power reception from the muscle compare to the latter design. Probe (d) is shown to behave as an array of 3 dipoles, while probe (f) acts as a 4-elements radiator. A comparison is given with respect to the important functionality of receiving power from the muscle layer.

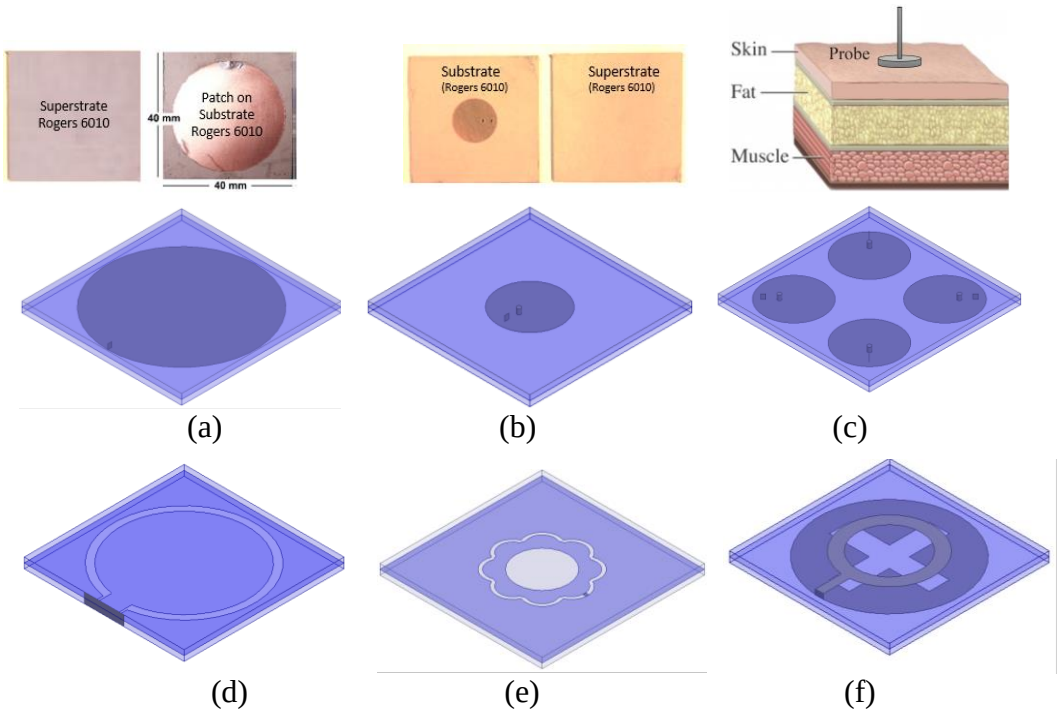

Figure: Various probes designed to be place on the skin and receive power from the muscle. All probes are $4cm \times 4cm$ in size.