Technology Licensing Opportunity

UNIVERSITY OF SASKATCHEWAN

POLYMER RESONATOR ANTENNAS USING COMPOSITE MATERIALS

Invention

A radically different approach to fabrication of compact radio frequency (RF) antennas and devices using non-traditional polymer-based materials, enabling improved performance and increased functionality for various emerging wireless communication and sensor devices. The relentless pursuit of device miniaturization for such systems often comes at the price of compromised performance.

One of the biggest obstacles to further miniaturization of RF wireless devices is the antenna structure, which accounts for a large portion of the total size. Despite the superior properties of DRAs, they have not been widely adopted for commercial wireless applications due to complex and costly fabrication processes related to their three dimensional structure and difficulties in shaping the hard ceramic material.

The new approach described in this invention to facilitate the adoption of DRAs for commercial applications is to use polymer-based materials (so-called **polymer resonator antennas - PRAs).**

The premise of the approach was two-fold:

1) the natural softness of polymers could dramatically simplify fabrication of dielectric elements, enabling for instance the use of lithographic batch fabrication or other 3D printing or micromachining processes;
2) the elements must be effectively excited to resonate and radiate at microwave and millimeter-wave frequencies.

This invention utilizes composite materials with varying permittivity values. In a broad aspect, this invention is based upon various composite materials with dielectric properties for use in microwave applications, whereby the composite material comprises a filler with relative permittivity of at least 4, and a polymer constituent, wherein the composite material has a relative permittivity of at least 3 for microwave frequencies. In some embodiments, the filler comprises a ceramic constituent.

Benefits to our approach

The natural softness of polymers and other composite materials will dramatically simplify fabrication and their low relative permittivity will further enhance the impedance bandwidth of the DRAs. Our new PRAs can further reduce the size of conventional DRAs by up to 50%, and enable modes offering additional control over bandwidth and frequency response. One of the advantages of PRAs is that numerous polymer types with special characteristics can be used to fulfill the requirements of particular applications or achieve extraordinary benefits.

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