

Barium Strontium Titanate Nanocomposite Dielectric Inks for Flexible RF and Microwave Electronics Applications

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Abstract

Tunable radio frequency (RF) and microwave (MW) devices are very important in terms of reconfigurable systems and if combined with additive manufacturing and printed electronics can provide advantageous in terms of cost, size and form factor. The demand for printable electronics over conventional electronics is rising exponentially due to various reasons, such as the extremely low fabrication cost, low material consumption and wastage, compatibility with flexible substrates, durability, etc. Barium Strontium Titanate (BST) has been extensively investigated over the last few decades due to its tunable dielectric properties. The dielectric constant of BST can be tailored by an applied electric field, which allows BST to be used in varactors for tunable RF and MW applications such as tunable filters, phase shifters, frequency selective surfaces, phased array and conformal antennas. Previously used deposition techniques are not viable for flexible electronic devices due to the higher processing temperature and/or the cost and/or the difficulty of making patterns. In this work, BST-polymer nanocomposite dielectric inks were developed to fabricate RF and MW devices on flexible substrates. In this talk, details on fabrication of these inks, printing and integration of the inks in devices, electromagnetic characterization of these inks, as well as uses of this ink in resistive inks will be described.