Tunable RF Modules with Barium Strontium Titanate (BST) Based Capacitors for Adaptive Electronics

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Abstract:

Recently, there is increasing interest in implementing adaptive RF electronics blocks such as, tunable impedance matching networks, voltage controlled oscillators (VCOs), tunable power splitters, phase shifters tunable band stop and band pass filters with tunable capacitors (varactors). Tunable blocks can cover multiple bands and gives flexibility in fabrication to attain given performance. Conventional p-n junctions, micromechanical devices or BST capacitors can be used as a varactor. Conventional p-n junctions mostly tune in the reverse biased mode and forward bias results in excessive power dissipation because of large flow of current. In addition, they cannot be integrated on low loss substrates. In the case MEMS devices, they are delicate to handle especially during packaging and usually need high voltages. Tunable BST capacitors offer the advantages process independent integration on low loss substrates and bidirectional tuning. In this presentation, we will cover our work on BST capacitor based inter-digited tunable band filters, multistage tunable band stop filters, tunable power amplifiers, VCOs, tunable power splitters and tunable patch antennas. We will present design, simulation, fabrication and characterization of these modules.