Low voltage, high Q $Bi_{1.5}MgNb_{1.5}O_7$ thin film varactors

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Abstract: The $Bi_{1.5}MgNb_{1.5}O_7$ (BMN) thin film varactors were fabricated on sapphire substrates by RF magnetron sputtering and microfabrication technologies. The sputtered BMN thin films exhibited low dielectric loss of ~0.0018-0.007, and superior dielectric tunability of ~ 50% at an applied bias field of 1.5 MV/cm with the maximum permittivity of 179. The dielectric properties of varactors employing BMN thin films was investigated. The BMN thin film varactors demonstrated a high Q-factor of 356 at 1 MHz, but this value slightly decreased with increasing frequency in the frequency range of 100 MHz-6 GHz due to the Q-factor restricted by the conductive loss of electrodes at high frequencies.

Keywords: Dielectric tunable; Q-factor; BMN thin films; Varactors