Metallodielectric Electromagnetic Band Gap (MEBG) Surfaces with Tunable Characteristics

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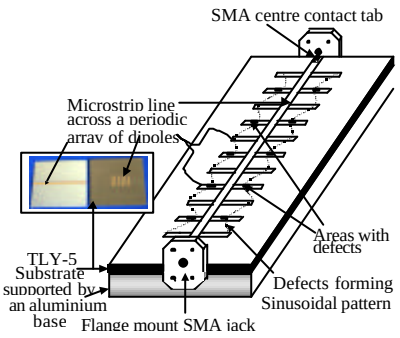
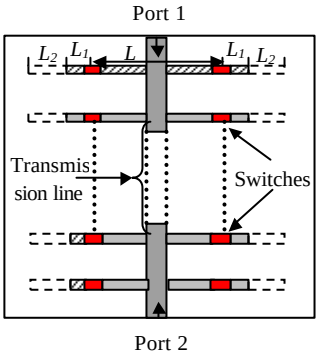
Metallodielectric Electromagnetic Band Gap (MEBG) surfaces are prime candidates for yielding controlled band gap performance due to their resonant nature. Here we present the performance of optically tunable MEBG surfaces formed by printed dipole arrays with several configurations. Photonic tuning is achieved by utilising the photoconductive properties of silicon. High resistivity (typically $\rho > 6$ kΩ-cm) silicon microswitches are positioned appropriately in order to allow the dimensions of the resonant elements to be altered. This is achieved by switching between the on or off state, thus yielding a reconfigurable band gap. Low power LEDs are placed directly above the switches and emit a uniform optical beam of about 5mW and 7.5mW when driven at 0.5 Amps and 2 Amps respectively. Figure 1 shows results measured during dynamic tuning of a dipole MEBG array achieved by switching on and off defects in the array. Figure 2 presents simulation results showing the effect of tuning the resonant length, and hence the band gap, of a dipole array.





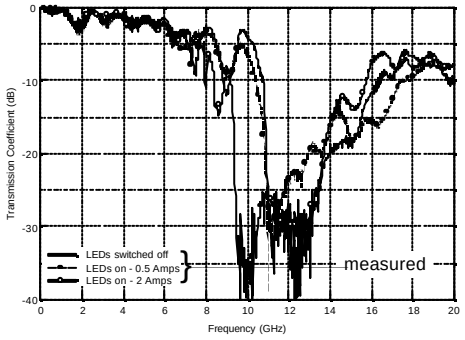


Figure 1

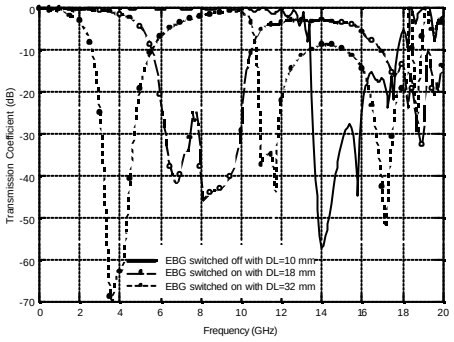


Figure 2