Abstracts

Improved photonic bandgap cavity and metal rod lattices for microwave and millimeter wave applications

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We report an experimental and theoretical study of a photonic bandgap (PBG) cavity with improved coupling of the TE/sub 10/ rectangular waveguide mode into the cavity. The 17 GHz PBG cavity is built with a triangular array of metal rods with a defect (missing rod) in the center. The TM/sub 010/-like defect mode is the operating mode for this cavity. In the experiment, critical coupling was achieved by removal or by partial withdrawal of some rods, a result that was verified by simulations. We also report simulation results of PBG structures in metal rod lattices useful for vacuum microwave electron devices. The bandgaps for the fundamental and higher-frequency oscillations in the lattices are determined. These results show that PBG cavities are very promising for applications in active and passive devices at microwave and millimeter wave frequencies.

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