Abstract Submitted
for the DPP10 Meeting of
The American Physical Society

Photonic Bandgap Metallic Structures for High Power Microwave Applications[1] M. SHAPIRO, B. MUNROE, MIT PSFC, R. MARSH, LLNL, E. NANNI, E. KOWALSKI, A. COOK, R. TEMKIN, MIT PSFC — High power applications of photonic bandgap (PBG) structures include particle accelerators and vacuum electron devices. Metallic PBG structures are promising for high gradient linear accelerators to suppress high order mode wakefields. The MIT 17.1 GHz PBG based accelerator demonstrated a gradient of 35 MV/m for the input power of 2 MW. The gradient is limited by pulsed heating of rods in the PBG structure. The pulsed heating experiments at 11.4 GHz were conducted at SLAC. Gradients of 110 MV/m were measured and the breakdown rate vs. gradient was determined experimentally. An improved 11.4 GHz PBG structure with reduced pulsed heating by using elliptical rods has been built and is under test. Pulsed heating in a new 17.1 GHz PBG structure will be experimentally studied at MIT. The PBG structures may be used in vacuum electron devices. A new PBG gyrotron experiment has been designed – a 1 kW, 250 GHz gyroamplifier with a gain of 50 dB. Research has been conducted on a non-gyrotron high frequency PBG based device, an overmoded W-Band (94 GHz) TWT.

[1]This work is supported by AFOSR and DOE HEP.

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Date submitted: 20 Jul 2010 Electronic form version 1.4