Abstract Submitted
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Three Dimensional Photonic Crystal Particle Accelerators[1]
CHRIS MCGUINNESS, Stanford University — Laser driven dielectric accelerator structures have recently become of interest due to the potential GeV/m accelerating gradients, high efficiency, low costs associated with large scale lithographic fabrication, and attosecond bunch lengths in such accelerating schemes. Photonic crystals provide an attractive way to confine laser radiation, allowing for the manipulation of the EM fields without the use of metallic boundaries. One structure that has been explored to this end is the woodpile structure. This structure is attractive because it has a fully three-dimensional bandgap, is amenable to common lithographic procedures, and allows for the design of additional accelerator components such as couplers and focusing fields. An eight and nine layer woodpile structure with a defect designed to support an accelerating mode has been fabricated. The structures were fabricated using a combination of nanofabrication techniques that will be described. Limits imposed by the optical lithography set the minimum feature size to 400 nm, corresponding to a structure with a bandgap centered at 4.26 μm. Reflection spectroscopy measurements reveal a peak in reflectivity about the predicted region, and good agreement with simulation is shown.

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