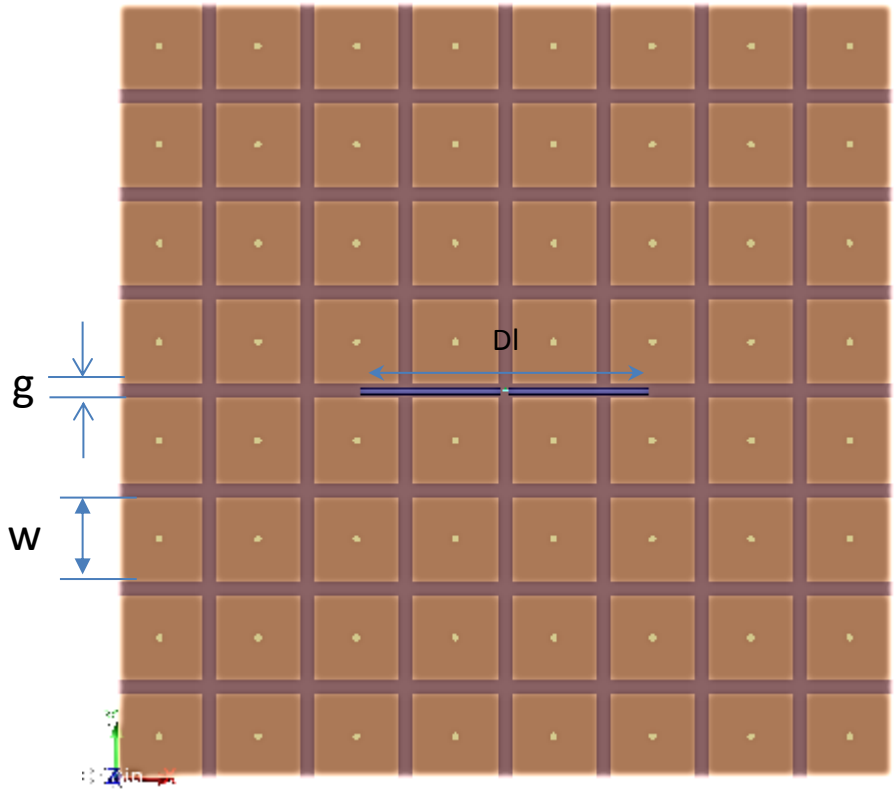
Electromagnetic Band-Gap(EBG)

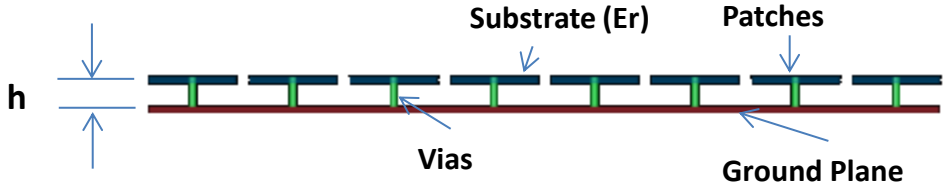
: Metamaterials

Anil

Geometry of mushroom-like EBG Structure

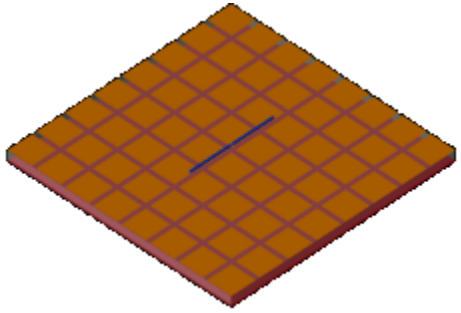


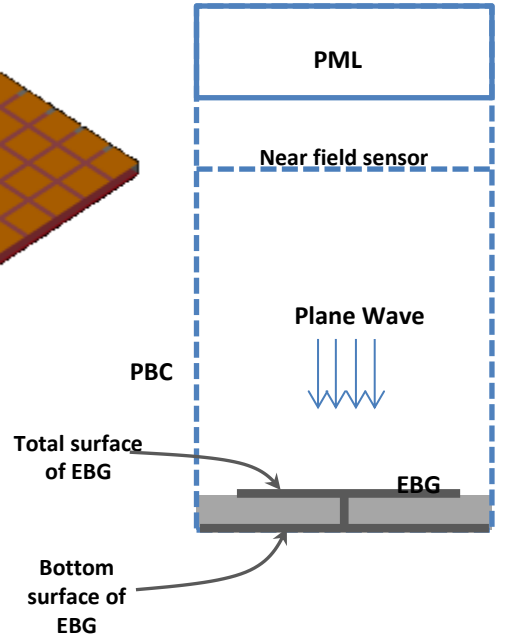
Top View



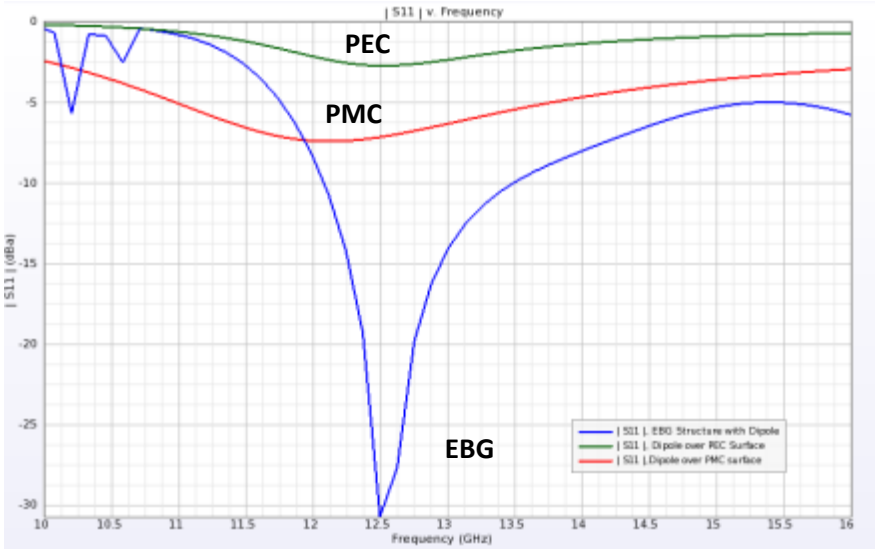
Side View

Parameters		Value
Width of patch	w	3 mm
Gap between Patch	g	0.5 mm
Height of substrate	h	1 mm
Dielectric constant	Er	2.2
Diploe length	Dl	10 mm
Dipole radius	Dr	0.12 mm

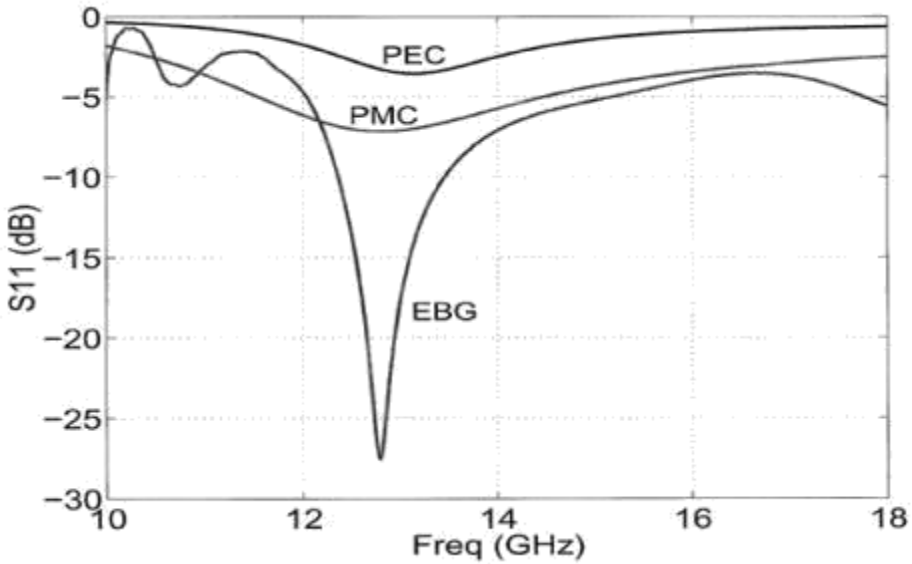




Comparison of the PEC, PMC, and EBG Ground Planes



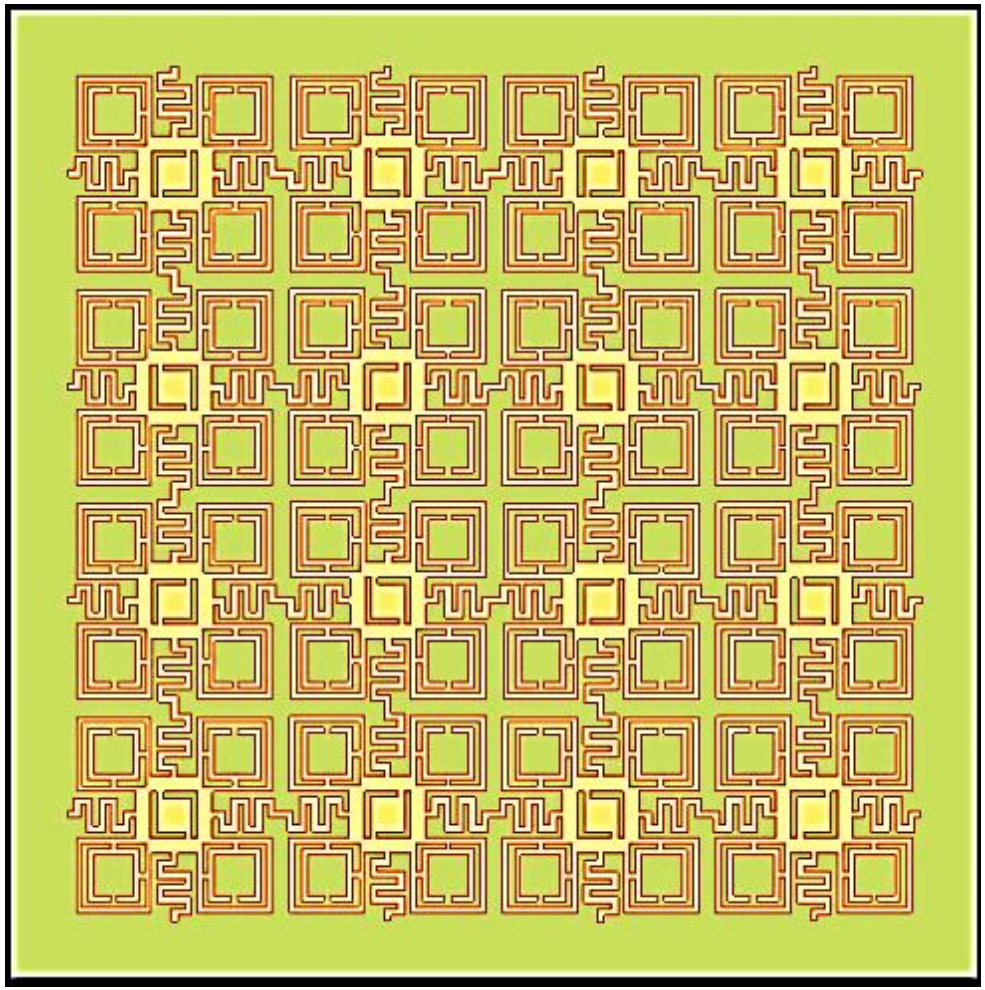
FDTD simulated return loss results of the dipole antenna over the PEC,PMC, and EBG ground planes

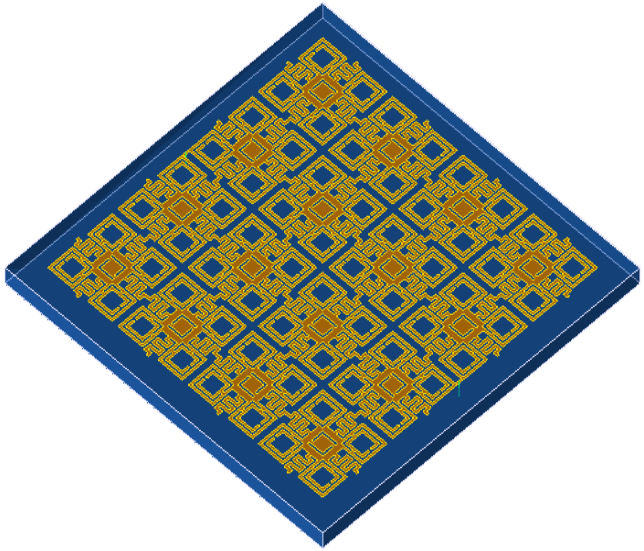


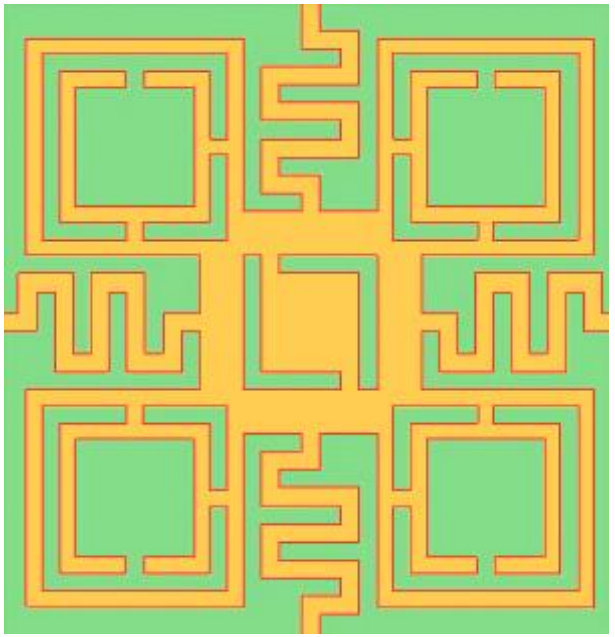
Published data in IEEE paper

- With the PEC surface as the ground plane, the return loss of the dipole is only -3.5 dB
- When the PMC surface, which has a reflection phase of 0 , is used as the ground plane the dipole has a return loss of – 7 dB
- The best return loss of -30 dB is achieved by the dipole antenna over the EBG ground plane. The reflection phase of the EBG surface varies with frequency from 180 to 180. From this comparison on it can be seen that the EBG surface is a good ground plane candidate for a low profile wire antenna design

Design in EMPro

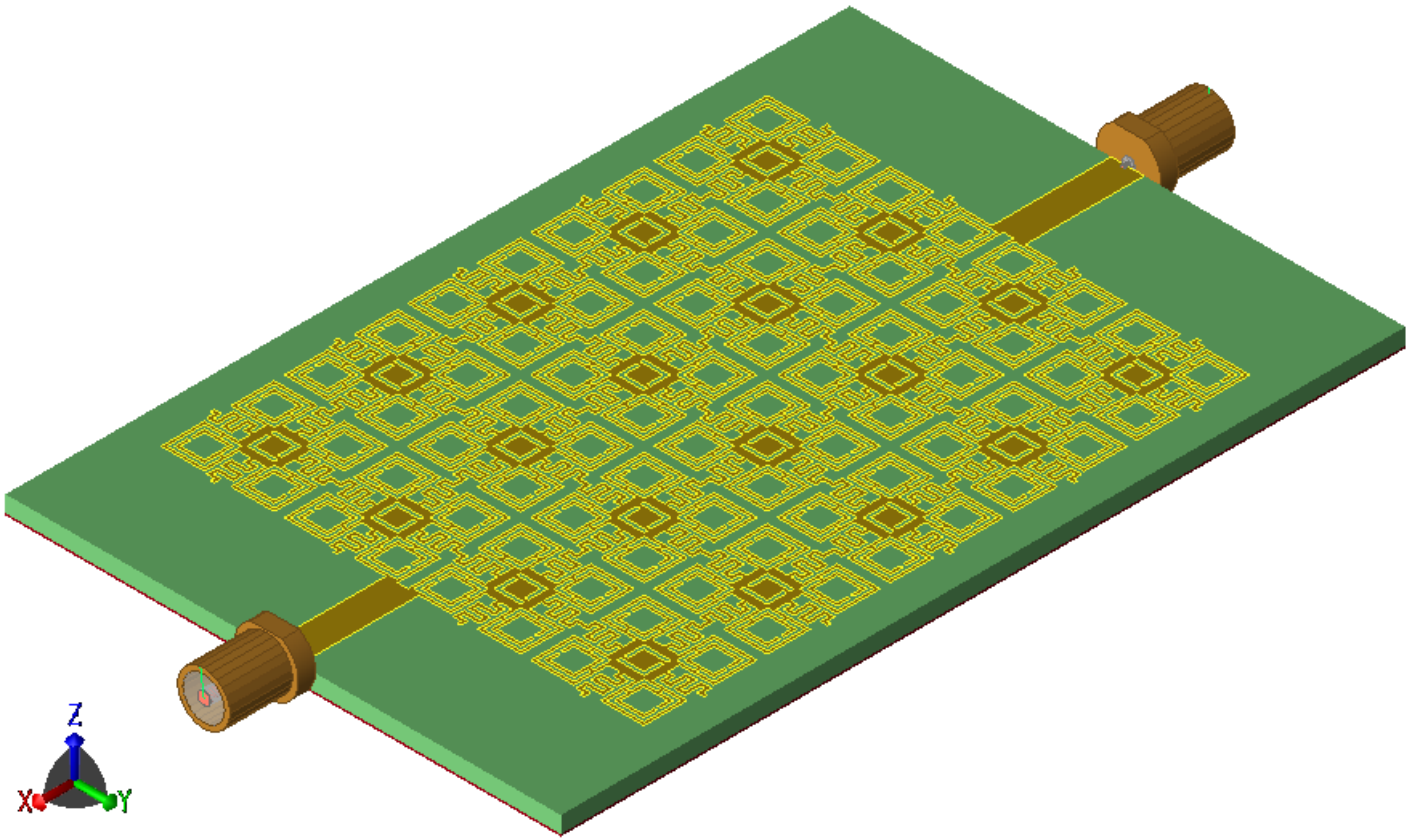




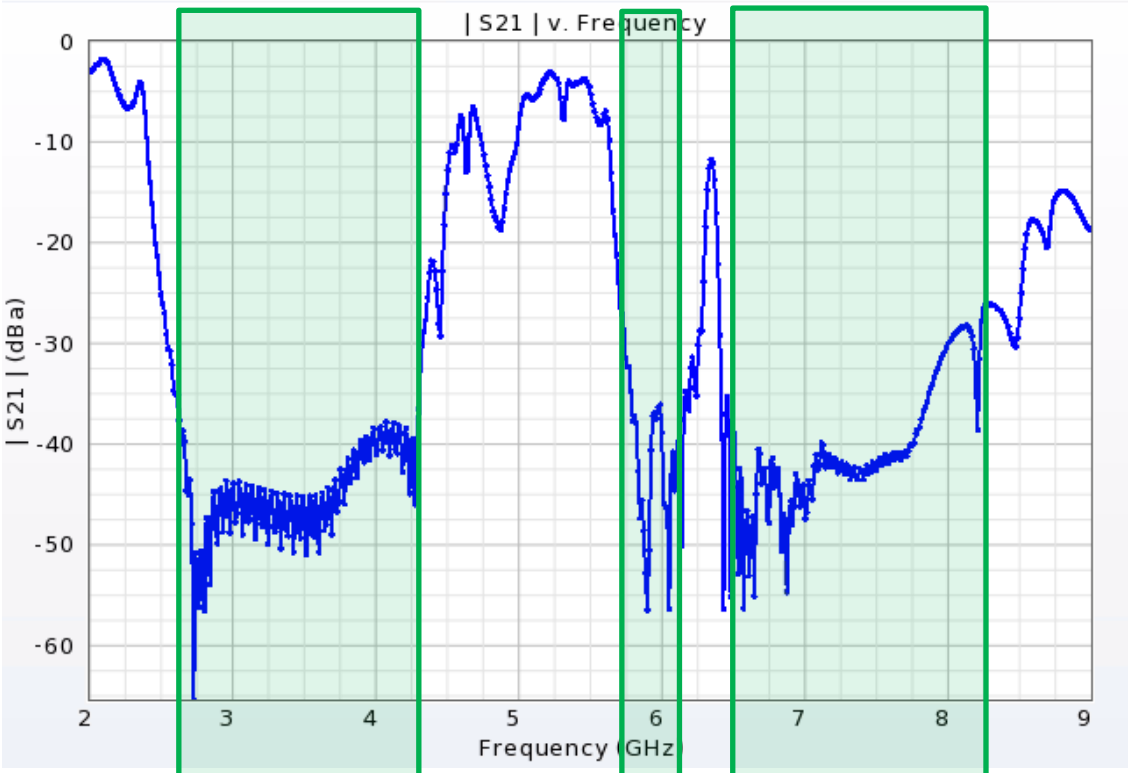


Simulation Setup in EMPro

- To find the bandgap, a 4 x 4 lattice of the EBG cell
- EBG Array acts as a Filter

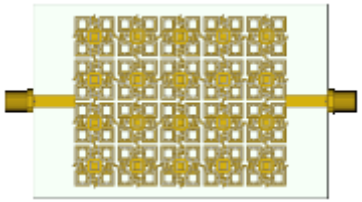


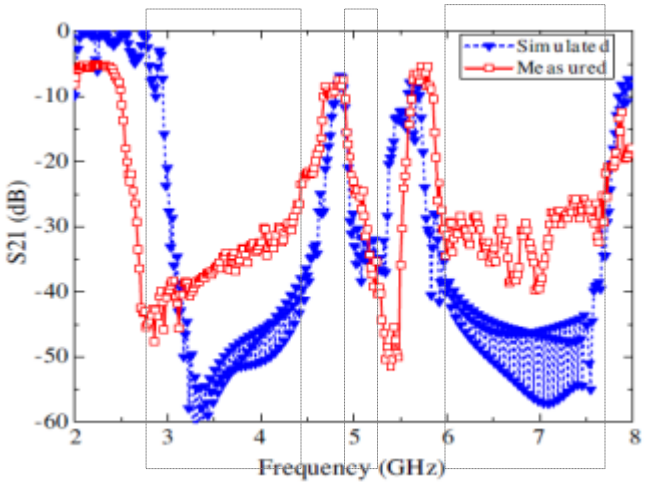
EMPro FDTD simulation and Measured Data



Stopband-1 **Stopband-2** **Stopband-3**

EMPro simulated Data





Published & Measured Data