Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

**Some observations on hyperuniform disordered photonic bandgap materials, from microwave scale study to infrared scale study**[1] SAM TSITRIN, GEEV NAHAL, San Francisco State University, MARIAN FLORESCU, University of Surrey, UK, WEINING MAN, San Francisco State University, SAN FRANCISCO STATE UNIVERSITY TEAM, UNIVERSITY OF SURREY TEAM
— A novel class of disordered photonic materials, hyperuniform disordered solids (HUDS), attracted more attention. Recently they have been experimentally proven to provide complete photonic band gap (PBG) when made with Alumina or Si; as well as single-polarization PBG when made with plastic with refract index of 1.6. These PBGs were shown to be real energy gaps with zero density of photonic states, instead of mobility gaps of low transmission due to scattering, etc. Using cm-scale samples and microwave experiments, we reveal the nature of photonic modes existing in these disordered materials by analyzing phase delay and mapping field distribution profile inside them. We also show how to extend the proof-of-concept microwave studies of these materials to proof-of-scale studies for real applications, by designing and fabricating these disordered photonic materials at submicron-scale with functional devices for 1.55 micron wavelength. The intrinsic isotropy of the disordered structure is an inherent advantage associated with the absence of limitations of orientational order, which is shown to provide valuable freedom in defect architecture design impossible in periodical structures.

[1]NSF Award DMR-1308084, the University of Surrey's FRSF and Santander awards.

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Date submitted: 14 Nov 2014 Electronic form version 1.4