Generating Steep Phase Anisotropy With Zero-Backscattering By Arrays of Coupled High Permittivity Dielectric Nanoresonators

FENG WANG, CINT, Los Alamos National Lab, QI-HUO WEI, Liquid Crystal Institute, Kent State University, HAN HTOON, CINT, Los Alamos National Lab — Simultaneous excitation of electric and magnetic dipolar modes in high-permittivity dielectric nano-resonators can lead to zero-backscattering, i.e. full transmission. Here, we numerically demonstrate that stable or unstable zero-backscattering by 2-dimensional (2D) arrays of Si nano-resonators can be realized. We also show that this Si nano-resonator array with anisotropic periodicity can generate approximate $2\pi$ optical phase anisotropy for the transmitted light at the wavelength of zero-backscattering. By introducing strong Fano-type coupling into unit cells of the array, ultra-steep phase anisotropy can be achieved. These special optical properties promise applications in various transmissive photonic devices, and we show their potential applications in transmissive polarization conversion and sensing.

Feng Wang
CINT, Los Alamos National Lab

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