

Observing the role of localized mode in surface plasma-like dispersion

Zeyong Wei, Jinxin Fu and Hongqiang Li ^{a)}

Physics Department, Tongji University, Shanghai 200092, China

^{a)} Corresponding E-mail: hqlee@mail.tongji.edu.cn

Locally resonant mode in Ebbesen effect [Nature (London) 391,667(1998)] is observed in microwave region, showing abundant physics phenomena such as polariton band, large band gap and high transmission at occidental incidence. Local resonance below the diffraction limit gives rise to a *flat band* [Fig.1] (*gap*) with transverse *electric* (*magnetic*) polarization in surface mode dispersion and perfect transmission with strong enhancement of local field. While near or upper the diffraction limit, it becomes strongly coupled to Bragg diffraction, showing large surface wave band gaps, flat polariton band as well as high transmission frequencies not scaled by period [Fig.2]. For small aperture-period ratio, high transmission is hardly achieved without local resonance. Even mode of the surface plasma is the consequence of the interaction between local resonance and Bragg scattering while the odd mode keeps untainted from local resonance.

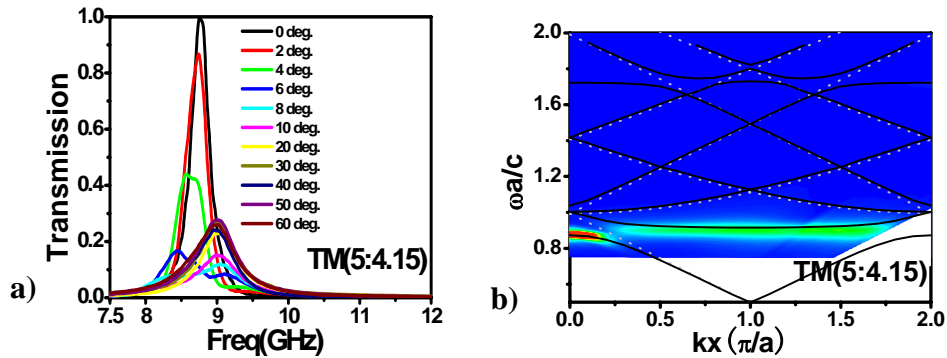


Fig.1: (a) Transmission spectrum and (b) surface wave dispersion with measured transmission spectrum in TM mode below diffraction limit.

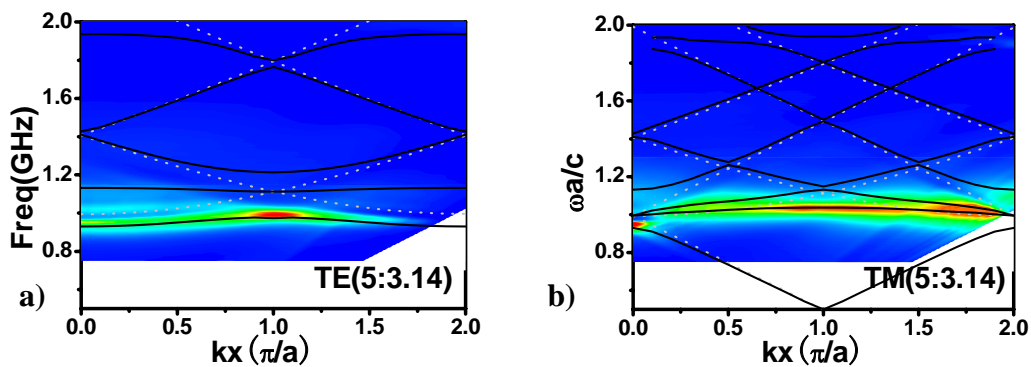


Fig.2: Surface wave dispersion with measured transmission spectrum (a) in TE polarization and (b) TM polarization