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Theory of Plasmonic Wave Propagation Along a Periodic Chain of Nanoscale Pores in a Metal[1] DAVID STROUD, Ohio State Univ., KWANG-MOO KIM, Univ. of Maryland — We have calculated the dispersion relations and group velocities of plasmonic waves propagating along a periodic chain of nanoscale pores in a Drude metal, using a tight- binding formalism. The propagating modes are Bloch waves constructed from linear combinations of electromagnetic modes of the individual pores embedded in a metallic host. In contrast to the analogous plasmonic waves propagating along periodic chains of metallic nanoparticles in a dielectric, the pore waves do not suffer radiative losses, and the tight- binding approach is not restricted to the quasistatic approximation or to particles small compared to a wavelength. We have also calculated the plasmonic band structure for waves propagating through a three-dimensional inverse opal structure of pores in a metallic host. We discuss the possibility of generating and detecting these waves in porous metals and porous superconductors.

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