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Localization of coupled plasmon modes in graded plasmonic chains[1] JUN JUN XIAO, Chinese Univ. of Hong Kong, K. YAKUBO, Hokkaido Univ., Japan, K. W. YU, Chinese Univ. of Hong Kong — Electromagnetic energy propagation and localization in plasmonics offer the potential for integrated nanophotonics. Plasmonic waves occur naturally inside the subwavelength scale with lateral confinement below the diffraction limit. However, controlling their localization/delocalization behavior in the propagating (longitudinal) direction is also desirable. We present results of longitudinal localization-delocalization tuning of coupled plasmon modes in graded chains of metallic nanodots. Two graded models will be studied: incremental spacing between the nanoparticles and graded index of refraction in the host medium. The coupled plasmons in these systems exhibit strong localization when detuned from the Mie plasmon frequency, showing a tunable passband in finite size system. To understand the localization mechanism, we map the problem onto an equivalent system of one-dimensional chain of coupled harmonic oscillators, whose coupling strength is gradually varied from one end to the other, with additional on-site potentials. The results can be applied to analogous graded systems. Confining and transmitting electromagnetic energy in these structures may pave new way for many fruitful applications in plasmonics.

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