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Optical Plasmonic Switch based on Graphene[1] KYUNGSUN MOON, SUK-YOUNG PARK, Dept. of Physics, Yonsei University — We have studied an electro-optical plasmonic waveguide, which controls the transmission of incident light by switching the coupling of the surface plasmon polariton (SPP) localized on graphene. It has been previously shown that the propagation length of the SPP localized on the copper surface can be effectively reduced by a factor of two or three by applying external bias potential. In our study, we have demonstrated that the propagation length of the SPP localized on graphene can be dramatically reduced by a factor of ten or so and the wavelength of SPP can be reduced by several hundredths of that of the incident light as well. We have also investigated the effect of scattering times of graphene and active Si layer on switching line shape. Switching occurs upon varying the carrier density of Si layer by ?n/n_c∼1% in the vicinity of switching region. For a fixed bias voltage applied just below the critical value, signal laser beam shone into the metal nano-particles may increase the carrier density as such, which will induce switching. This may help develop an all-optical nano-scale plasmonic switch.

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