

ABSTRACT

Surface Plasmon polariton (SPP) waveguides harbor many potential applications at visible and near-infrared (NIR) wavelengths. However, dispersive properties of the metal in the waveguide yields weakly coupled and lossy plasmonic modes in the mid and long wave infrared range. This is one of the major reasons for the rise in popularity of surface phonon polariton (SPhP) waveguides in recent research and micro-fabrication pursuit. Silicon carbide (SiC) is a good candidate in SPhP waveguides since it has negative dielectric permittivity in the long-wave infrared (LWIR) spectral region, indicative that coupling to surface phonon polaritons is realizable. Introducing surface phonon polaritons for wave guiding provides good modal confinement and enhanced propagation length. A hybrid waveguide structure at long-wave infrared (LWIR) is demonstrated in which an eigen mode solver approach in Ansys HFSS was applied. The effect of a three layer configuration i.e., silicon wire on a benzocyclobutene (BCB) dielectric slab on SiC, and the effects of varying their dimensions on the modal field distribution and on the propagation length, is presented