

Plasmonic metasurfaces for waveguiding and field enhancement

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Abstract

The explosive progress in nanoscience has led to uncovering and exploring numerous physical phenomena occurring at nanoscale, especially when metal nanostructures are involved so that optical fields and electronic oscillations can be resonantly coupled. The latter is the subject of (nano) plasmonics with implications extending from subwavelength waveguiding to localized field enhancements. In this review paper, we consider making use of various phenomena related to multiple scattering of surface plasmons (SPs) at periodically and randomly (nano) structured metal surfaces. After reviewing the SP waveguiding along channels in nanostructured areas exhibiting band-gap and localization effects, SP-driven field enhancement in random structures and plasmonic fractal drums is discussed in detail. SP manipulation and waveguiding using periodic nanostructures on the long-wavelength side of the band gap is also considered. © 2009 by WILEY-VCH Verlag GmbH & Co.KGaA, Weinheim.

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Keywords

Axicon, Band gap, Bessel beams, Field enhancement, Fractals, Localization, Random structures, Surface plasmons, Waveguides