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Plasmon propagation through a border between different layered systems observed by SNOM — •Andreas Englisch, Stefan Griesing, and Uwe Hartmann — Institute of Experimental Physics, University of Saarbrücken, P.O. Box 151150, D-66401 Saarbrücken, Germany

Quasi-twodimensional optics with plasmons involving refraction and reflection can be realized by different approaches. One possibility is to use elements consisting of a structured thin dielectric layer deposited on the plasmon-supporting surface. The resulting individual layers are the metal film with and without dielectric coating. The electromagnetic eigen modes are characterized by an effective refractive index which determines the propagation parallel to the plane of the layers (x-y plane). The behavior of plasmons or other modes incident to a border between two different multilayers is not known in detail. SNOM measurements are presented which show the intensity distribution at the border between different layerd systems: Due to the different decay length perpendicular to the x-y plane within both subsystems a near-field is formed at the border which extends across an area of several tens of microns. Although the intensity is confined to the x-y plane it cannot be modelled just by the interference of plasmons or other eigen modes of the given layered structure. In order to explain the observed intensity pattern an approach is introduced which is based on three-dimensional diffraction theory. Under particular conditions the border causes strong electromagnetic losses. The origin of these intrinsic or radiative losses is discussed in particular.

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