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Generic Theory of Surface Plasmon Polaritons at Active or Passive Metal-Dielectric Interfaces DENTCHO GENOV, MURALIDHAR AMBATI, XIANG ZHANG, University of California at Berkeley — In this work we propose a simple analytical approach to study the excitation of surface plasmon polaritons (SPP) at the interfaces between metals and passive or active media. Explicit relationships are derived for both SP dispersion and propagation length. The analytical theory matches the exact numerical calculations for a wide range of excitation frequencies and metal slab thicknesses. Scaling relationships for the critical gain required to achieve infinite propagation length are derived for the symmetric and antisymmetric SPP modes. A specific multiple quantum well (MQW) system is identified as an effective media for prospective experimental studies of SP amplification and enhanced propagation.

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