# Active surface plasmon photonics

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Active structures for the amplification and detection of surface plasmon polaritons (SPPs) are presented and discussed. The amplification of SPPs propagating along planar metallic waveguides occurs due to interaction with an adjacent optically-pumped dipolar gain medium. Physically realisable arrangements based on the single-interface and on symmetric thin metal films and stripes are described, along with the conditions required to achieve complete SPP loss compensation and SPP gain at visible and infrared wavelengths. The detection of SPPs is achieved using a Schottky contact detector implemented as a thin metal stripe on silicon; SPPs are launched along the stripe via end-fire coupling at energies below the band gap of silicon (infrared wavelengths) and are detected via internal photoemission.