Plasmonic enhanced internal photoemission in the near and the mid IR

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The detection of light at the infrared part of the spectrum is desired for large variety of applications. Unfortunately, silicon cannot be used for this purpose because of its large energy bandgap, typically larger than the energy of the photon to be detected. A common solution, in particular for the wavelength region around 1.5 microns is to use InGaAs technology. While InGaAs detectors performs very well in this spectrum regime, they are expensive for fabrication and cannot be integrated with monolithic silicon technology. In this talk, we demonstrate the detection of light using monolithic silicon technology by using the concept of plasmonic enhanced internal photoemission process. Using this approach, photons with energy exceeding the Schottky barrier between metal and silicon can “jump” over the barrier and be collected as photocurrent. We will demonstrate our recent results in the near and the mid IR, explain the limiting factors and discuss the future directions for implementing this technology in integrated photonic circuits and in focal plane arrays.