



Focal Technology Area 2: Nano-Photonics Research

SWIR (Short Wave Infrared) to Visible Image Up-Conversion Integrated Device

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Research

An up-conversion imaging layer, which converts infrared images into visible images. It is composed of a quantum dots or quantum columns detection layer that absorbs the infrared light, and the absorption is enhanced by surface plasmons. Holes and electrons generated by the incidental SWIR light are drifted toward an OLED layer and recombined to generate visible photons. The lateral position of the absorbed IR photon is in full spatial registration with the emitted visible photon and thus, full imaging capability is feasible. This wavelength up-conversion is carried out through a linear conversion and with relatively high conversion efficiency, where an external electric field is induced to supplement the energy difference between the SWIR energy absorbed and the visible light energy emitted.

A second design option is to use a Liquid Crystal Optical Spatial Light Modulator (LC-OSLM) configuration. In this apparatus, the photo-excited charge carriers induce a localized electric field in the LC, so that the SWIR serves as the writing light. The reading light is a green light that is reflected locally from the location where there was absorption of SWIR light, thus generation the visible image.

Applications & Products

Light-weight SWIR glasses for drivers, fire fighters and for defense applications.