Ultra-broadband mid-wave-IR upconversion detection
In this Letter, we demonstrate efficient room temperature detection of ultra-broadband mid-wave-infrared (MWIR) light with an almost flat response over more than 1200 nm, exploiting an efficient nonlinear upconversion technique. Black-body radiation from a hot soldering iron rod is used as the IR test source. Placing a 20 mm long periodically poled lithium niobate crystal in a compact intra-cavity setup (> 20 WCW pump at 1064 nm), MWIR wavelengths ranging from 3.6 to 4.85 μm are upconverted to near-infrared (NIR) wavelengths (820-870 nm). The NIR light is detected using a standard low-noise silicon-based camera/grating spectrometer. The proposed technique allows high conversion efficiency over a wider bandwidth without any need for a shorter crystal length. Different analytical predictions and numerical simulations are performed a priori to support the experimental demonstrations. (C) 2017 Optical Society of America