

Low-Cost ZnO-Based Ultraviolet–Infrared Dual-Band Detector Sensitized With PbS Quantum Dots

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Abstract—A low-cost photoconductive dual-band detector based on a ZnO film sensitized with lead sulfide quantum dots (PbS-QDs) is reported. The UV response arises from the interband absorption of UV radiation by ZnO, and the IR response is due to the absorption in the PbS-QDs. The detector exhibits UV response from 200 to 400 nm with a peak responsivity of 4.0×10^5 V/W and detectivity D^* of 5.5×10^{11} Jones at 370 nm at room temperature. The observed visible–near IR response is from 500 to 1400 nm with a responsivity of 5.4×10^5 V/W and D^* of 7.3×10^{11} Jones at 700 nm operating at room temperature. By increasing the PbS-QD size, the IR response can extend up to 2.9 μm .

Index Terms—Dual band, lead sulfide quantum dots (PbS-QDs), low cost, ultraviolet–infrared (UV–IR), ZnO.