IMPROVEMENTS IN NIST VISIBLE PHOTODETECTOR MEASUREMENT UNCERTAINTY

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Abstract

The National Institute of Standards and Technology (NIST) has provided spectral power responsivity measurements of photodetectors for over a decade in the 350 nm to 1100 nm spectral region. Recent improvements in equipment and the measurement scale derivation have lead to decreasing the measurement uncertainty by factors greater than 4 in the spectral region below 400 nm. The improvements include the use of newly designed silicon photodiode "tunnel" trap detectors as the transfer standard from an electrical substitution absolute cryogenic radiometer (ACR). A number of laser wavelengths were used to determine the quantum efficiency of the trap detectors between 325 nm and 920 nm. The trap detectors were then used to calibrate four NIST silicon photodiode working standards in this same spectral region. This paper will discuss the equipment and methods used in determining the NIST spectral power responsivity scale and the improved uncertainty.

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