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**Metal-Semiconductor-Metal (MSM) Photodetectors with Single-walled Carbon Nanotube Film Schottky Electrodes on GaAs** ASHKAN BEHNAM, JASON JOHNSON, YONGHO CHOI, LEILA NORIEGA, University of Florida, GÜNHAN ERTOSUN, Stanford University, ZHUANGCHUN WU, ANDREW RINZLER, University of Florida, PAWAN KAPUR, KRISHNA SARASWAT, Stanford University, ANT URAL, University of Florida — We fabricate and experimentally characterize the dark and photocurrent in metal-semiconductor-metal (MSM) photodetectors with transparent and conductive single-walled carbon nanotube (CNT) film electrodes on GaAs. The dark current measurements of MSM structures reveal that the CNT film forms a Schottky contact on GaAs substrates. The Schottky barrier height and the CNT film workfunction are extracted to be approximately 0.55 and 4.6 eV, respectively, based on dark current measurements as a function of temperature. We also study the effect of device geometry on the dark current of the CNT film-GaAs MSM devices. Furthermore, we find that CNT film MSM devices exhibit a significantly lower dark current and higher normalized photo-to-dark current ratio compared to metal control samples. We explain these observations by comparing the interfaces in these structures. This work opens up the possibility of integrating CNT films as Schottky electrodes in conventional semiconductor electronic and optoelectronic devices.

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