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Low frequency Noise in Top-Gated Ambipolar Carbon Nanotube Field Effect Transistors[1] GUANGYU XU, Department of Electrical Engineering, University of California at Los Angeles (UCLA), FEI LIU, IBM T. J. Watson Research Centers (IBM), SONG HAN, UCLA, KOUNGMIN RYU, Department of Electrical Engineering, University of Southern California (USC), ALEXANDER BADMAEV, CHONGWU ZHOU, USC, KANG L. WANG, UCLA, UCLA TEAM, IBM TEAM, USC TEAM — Low-frequency noise of top-gated ambipolar carbon nanotube field effect transistors (CNT-FET) with aligned CNT growth onto the quartz substrate is presented. The noise of top-gated CNT-FETs in air is lower than that of back-gated devices, and is comparable with that of back-gated devices in vacuum. This shows that molecules in air act as additional scattering sources, which contribute to the noise. Different noise amplitudes in the electron-conduction region and hole-conduction region are due to both the Schottky barriers (SB) with respect to the conduction band and valance band and the scattering in the channel. The SB contact determines the sample conductance, and thus the noise; the channel scattering also determines the noise. The impact of channel length to the noise amplitude is discussed. This device offers a potential low noise CNT-FET structure.

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