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Environmental Effects on 1/f Noise in Graphene and CNT Based Devices¹ BRETT R. GOLDSMITH, YE LU, ZHENG TANG LUO, A.T. CHARLIE JOHNSON, University of Pennsylvania — Graphite related materials such as carbon nanotubes, graphene and graphene oxide show promise for future electronic and chemical sensor applications. Nanotubes and graphene, in particular, have been shown to make exquisitely sensitive chemical sensors. Due to their low carrier density, the 1/f noise in these nanomaterials is very high. Understanding the cause of this noise is particularly important for chemical sensing applications, and the noise common to these materials may be one barrier to current practical success for graphitic sensors outside the lab. We have compared the noise power spectral density (PSD) of these three materials in different chemical environments and at different temperatures. This information should play a key role in guiding the development of future sensing devices as well as helping to illuminate the atomic scale interactions which lead to enhanced or suppressed 1/f noise in graphitic materials.

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