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Electrical Transport in Ultra-Short Atomically Thin Devices MATHIAS BOLAND, M. JAVAD FARROKHI, MOHSEN NASSERI, DOUGLAS STRACHAN, University of Kentucky — Ultra-short nanoscale devices that incorporate atomically-thin materials have the potential to be the smallest electronics. These materials represent the ultimate size-scaling in the vertical dimension and could be ideal as channel, electrode, and dielectric materials for a variety of applications – especially for ultrafast electronics. Such extremely-scaled devices can show unique transport characteristics that depended sensitively on their atomic-scale configurations. Here we report several atomically-thin ultra-short device schemes we have been developing which includes those consisting of single and bilayer graphene channels. Electrical transport measurements show very unique characteristics between these ultra-short devices that are highly sensitive to the atomic layer number. This sensitivity suggests that these ultra-short devices are strongly dependent on the unique chiral nature of the charge carriers in these atomically-thin channel materials.

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