## **Observation of Phonon Anomaly at the Armchair Edge of A Single-Layer Graphene in Air**

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**Figure S1.** Raman mappings of (a) G band frequency, and (b) 2D band frequency for a SLG with a 30 degree angle between two edges. (c) I(2D)/I(G) obtained when laser polarization is parallel to the bottom armchair. (d) I(2D)/I(G) obtained when laser polarization is parallel to the top zigzag edge. We note that the I(2D)/I(G) mapping is not significantly varied with the laser polarization direction to the

edge. Also, the armchair edge exhibits a larger I(2D)/I(G) ratio. The width and height of all mappings are 15.8µm and 7.9µm respectively.

![](_page_1_Figure_1.jpeg)

Figure S2. (a) The G band profiles of the armchair edge obtained at various  $V_g$ . (b) The G band profiles of the zigzag edge obtained at various  $V_g$ . (c) Comparison of G band frequency for the armchair and zigzag edges plotted as a function of  $V_g$ .