

# Supporting Information

## Enhanced Tunneling in a Hybrid of Single-Walled Carbon Nanotubes and Graphene

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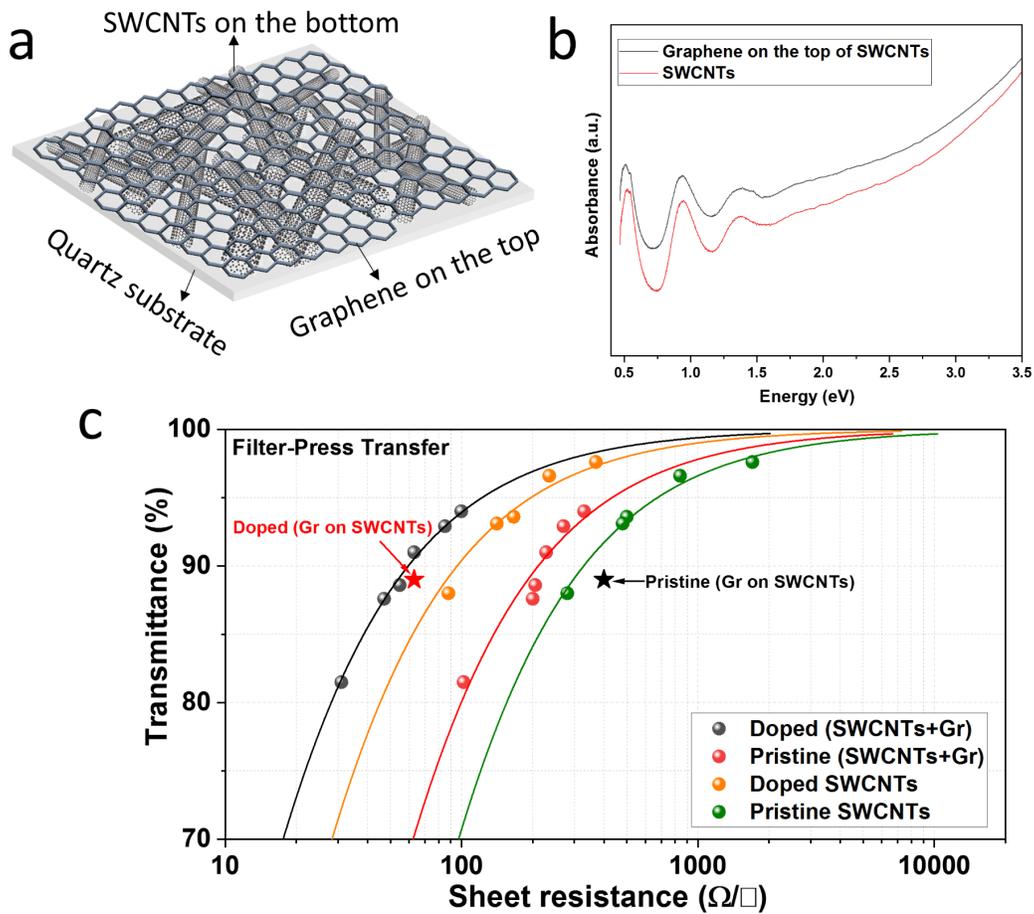


Figure S1: **The inverted approach: graphene on SWCNTs.** (a) A schematic of a hybrid with a graphene monolayer encapsulating SWCNTs on a quartz substrate. (b) The optical absorption spectra of the inverted graphene-SWCNT hybrid film. (c) A comparison against the data reproduced from Figure 1e-f.

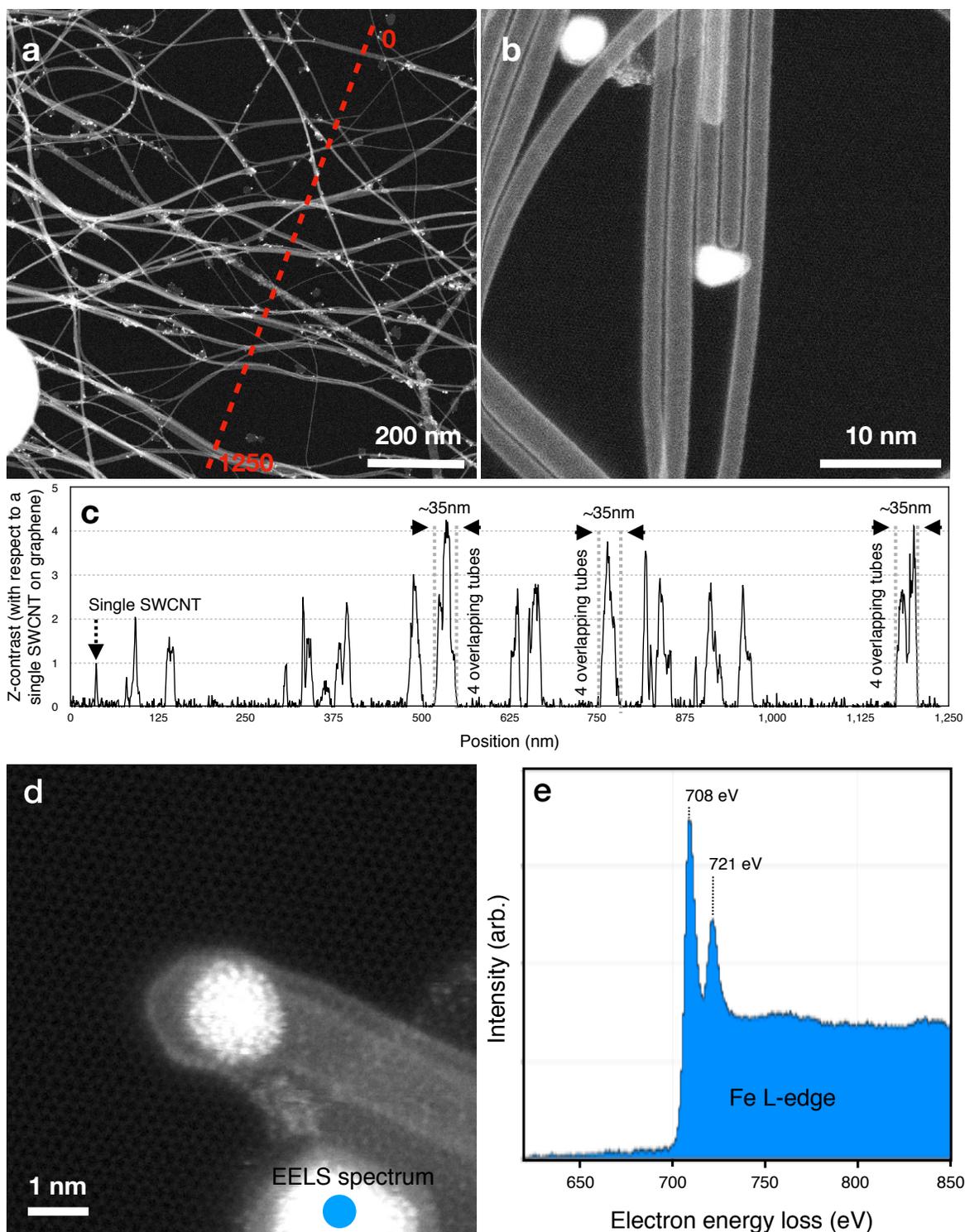


Figure S2: **Supporting STEM data.** MAADF overview (a) and closeup of ribbon-like SWCNT bundles on graphene. (c) A line-profile showing the scattering intensity along the line drawn in sub-panel (a). The intensity is plotted with respect to that of a single tube. (d) A tube with an encapsulated active catalyst particle and another, inactive, suspended next to it. (e) Electron energy loss spectrum acquired from the inactive particle showing it is iron.

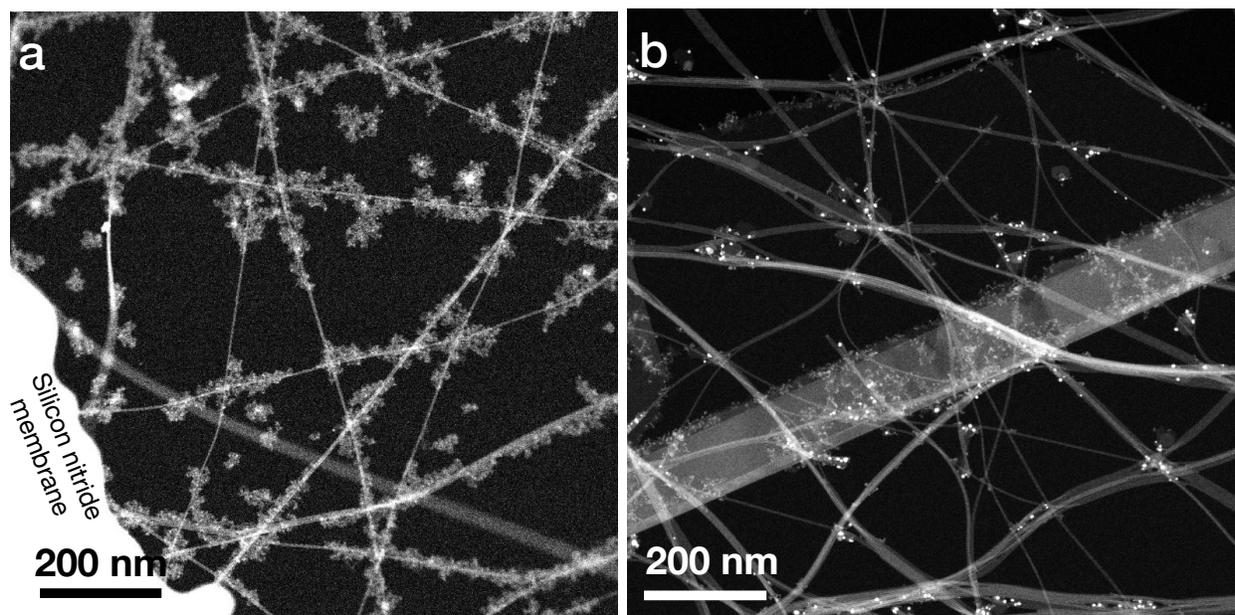


Figure S3: **STEM/MAADF images of SWCNT networks on graphene.** (a) 120 s deposition and (b) 600 s deposition. Note how the morphology changes from one dominated by X-junctions to emergence of Y-junctions when the layer thickness is increased.

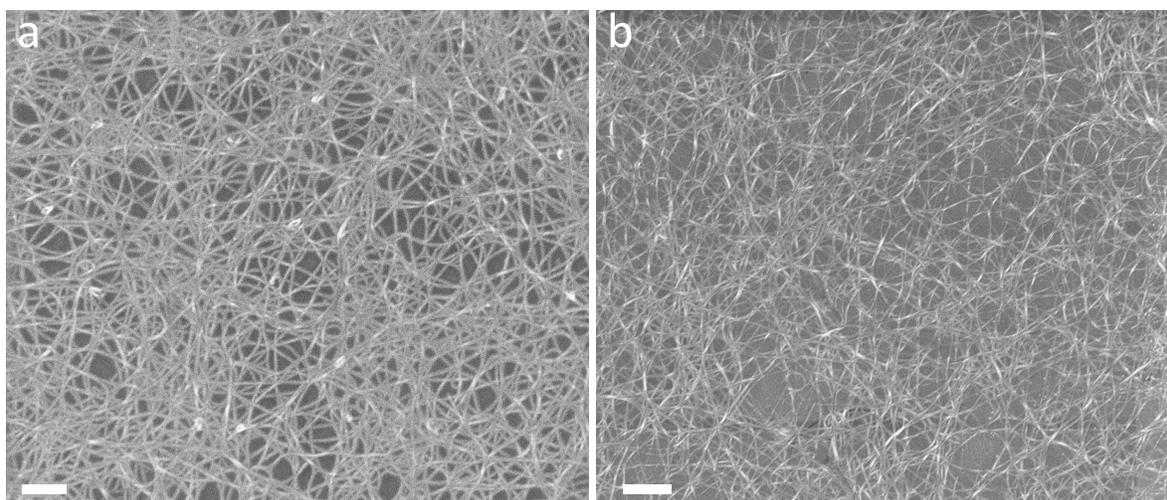


Figure S4: **SEM images of doped SWCNTs.** (a) On SiO<sub>2</sub> and (b) on graphene. The scale bars are 1 μm

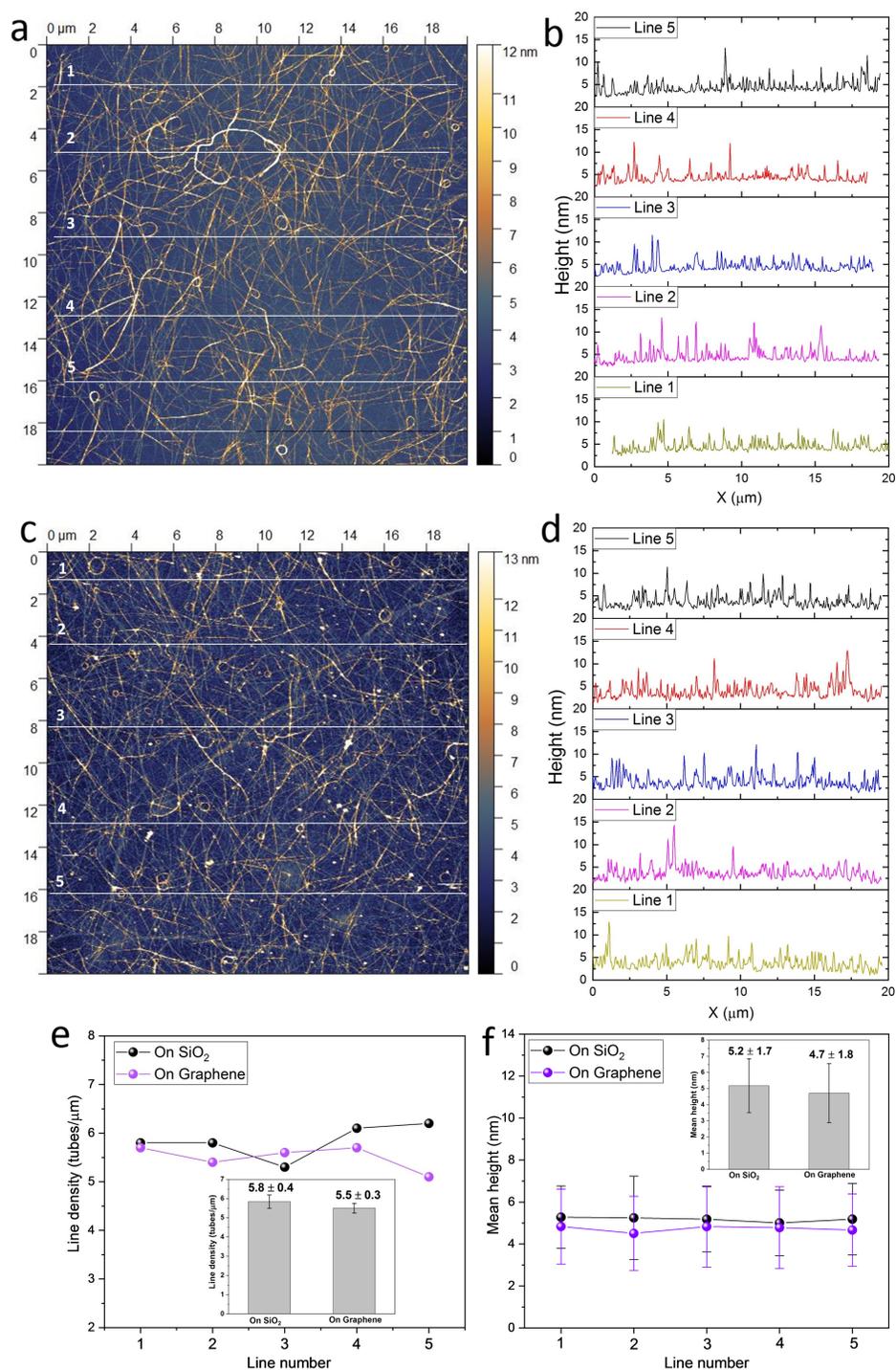


Figure S5: **AFM characterization.** (a) A 20 μm × 20 μm AFM image of a TP deposited SWCNT film on SiO<sub>2</sub> and (b) line profiles showing the z-height. (c) A similar scan on graphene and (e) and (d) the line profiles. The line density and mean height are given in (e-f), the inset in (f) representing the mean of total.

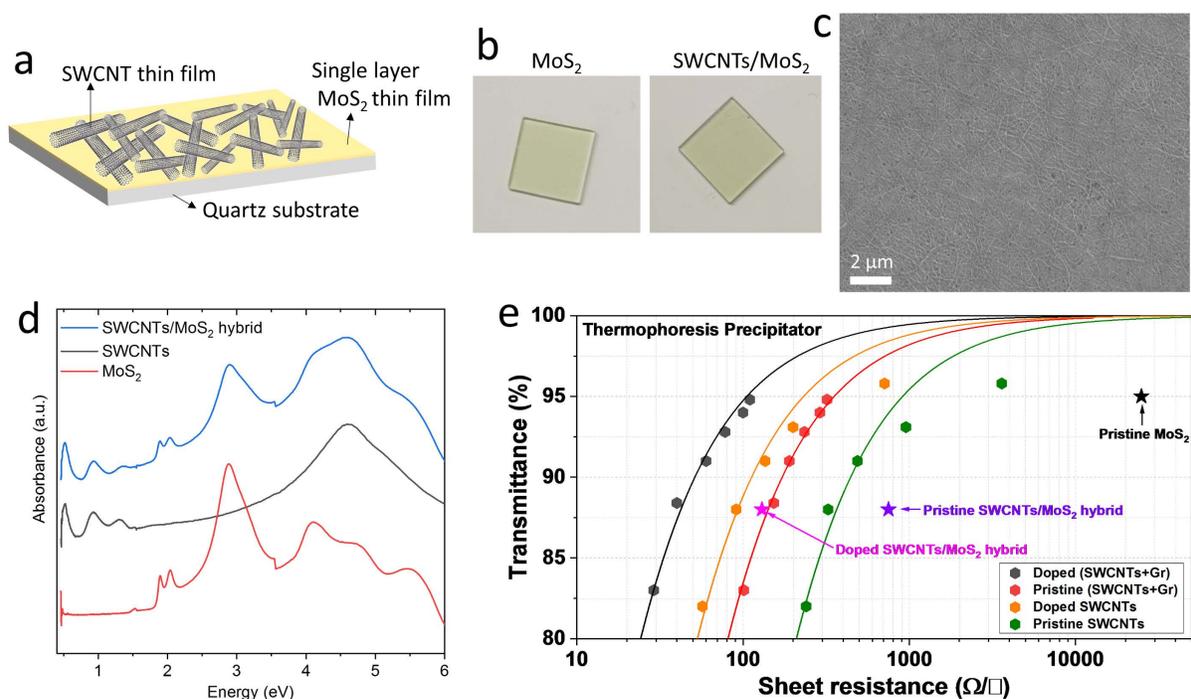


Figure S6: **MoS<sub>2</sub> substrate.** (a) An artistic rendition of SWCNTs on MoS<sub>2</sub>. (b) Photographs of MoS<sub>2</sub> and SWCNTs on MoS<sub>2</sub> (quartz substrate). (c) A SEM image of TP deposited SWCNTs on MoS<sub>2</sub>. (d) Optical absorption spectra of the films, showing the dominant excitations in MoS<sub>2</sub>. (e) Optical transmittance vs. sheet resistance of SWCNTs on MoS<sub>2</sub> compared to SWCNTs and SWCNTs on graphene (the data points are rearranged from Figure 1e-f).