Enhancement of Multi-Walled Carbon Nanotubes Electrical Conductivity using Metal Nanoscale Copper Contacts and its Implications for Carbon Nanotube-Enhanced Copper Conductivity

Chris J. Barnett,[†] James E. McCormack,[‡] Eva M. Deemer,[§] Christopher R. Evans,[¢] Jon E. Evans,[‡] Alvin Orbaek White,[†] Peter R. Dunstan,[¢] Russell R. Chianelli,[§] Richard J. Cobley,[‡] and Andrew R. Barron[†,$,¶*]*

[†] Energy Safety Research Institute, Swansea University, Bay Campus, Swansea SA1 8EN, UK.

[‡] College of Engineering, Swansea University, Bay Campus, Swansea, SA1 8EN, UK

[§] Materials Research and Technology Institute, University of Texas at El Paso, El Paso, Texas TX 79968, USA.

[¢] Department of Physics, College of Science, Swansea University, Singleton Park, Swansea SA2 8PP, UK.

[$] Department of Chemistry and Department of Materials Science and Nanoengineering, Rice University, Houston, Texas 77005, USA.

[¶] Faculty of Engineering, Universiti Teknologi Brunei, Jalan Tungku Link, Gadong, BE1410, Brunei Darussalam

Supplimental Information

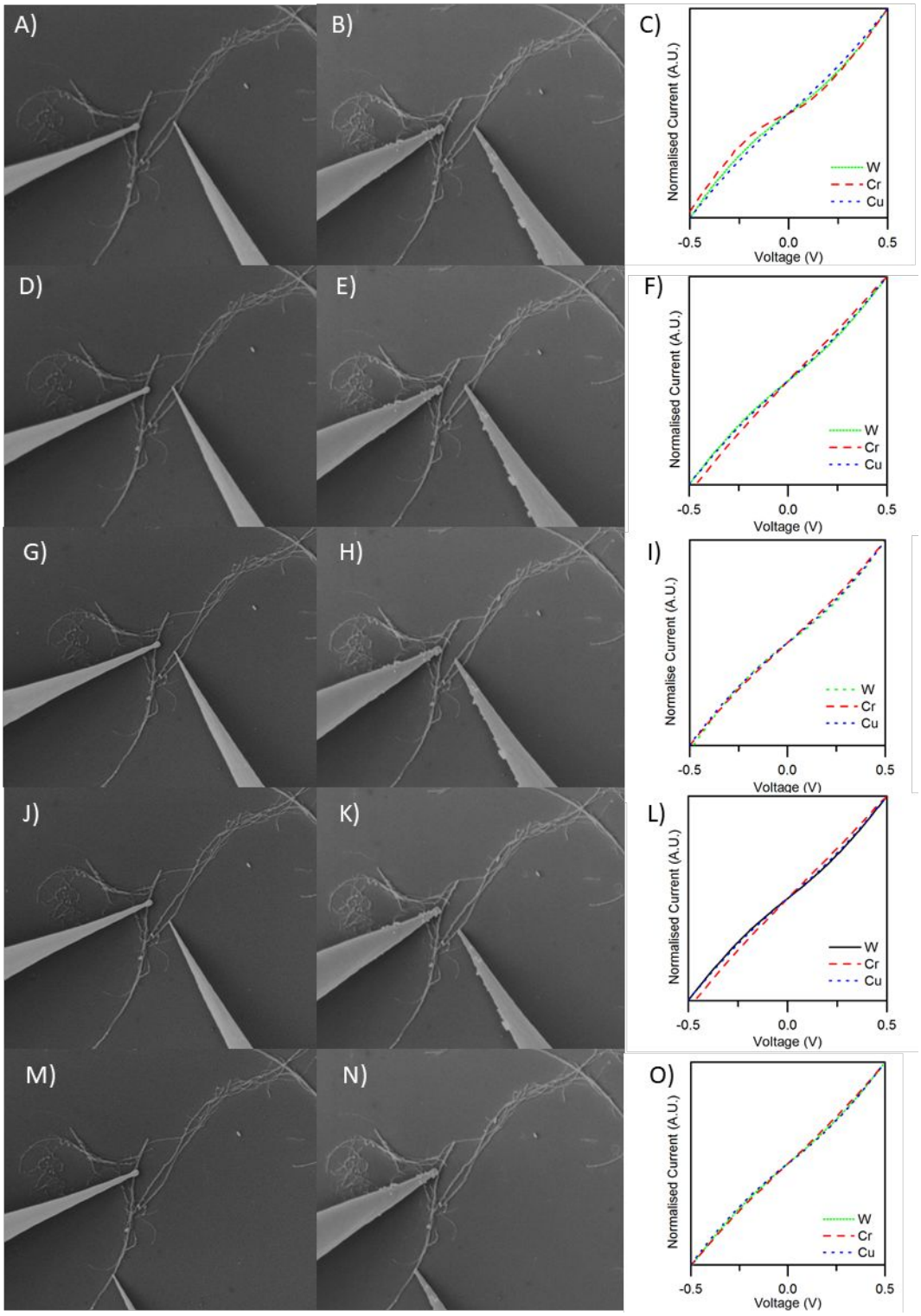

Figure S1. SEM images of the tip positions (a, d, g, j, and m) for W tip and (b, e, h, k, and n) for Cr tip along with corresponding normalized I-V graphs for (c) Position 1, (f) Position 2, (i) Position 3, (l) Position 4 and (o) Position 5.

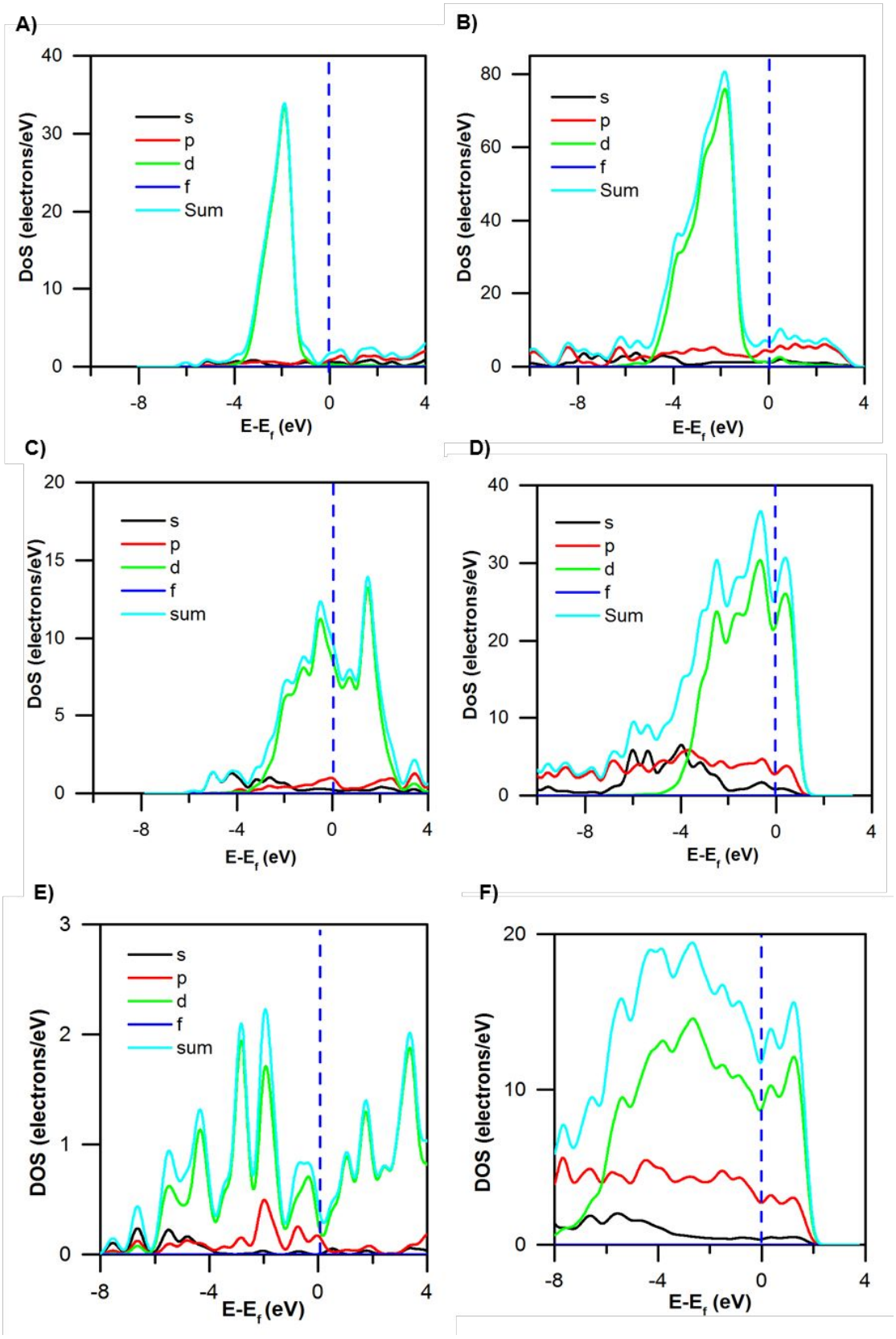

Figure S2. Diagram of the partial density of states for (a) Cu, (b) Cu on CNT, (c) Cr, (d) Cr on CNT, (e) W, and (f) W of CNT. Blue line indicates the Fermi Level.

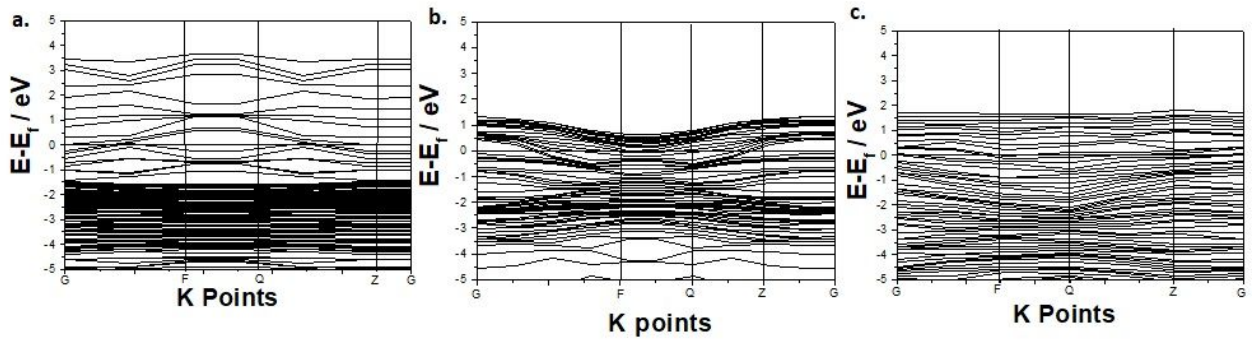

Figure S3. Electronic band structures for (a) copper with CNT, (b) chromium with CNT, and (c) tungsten with CNT.

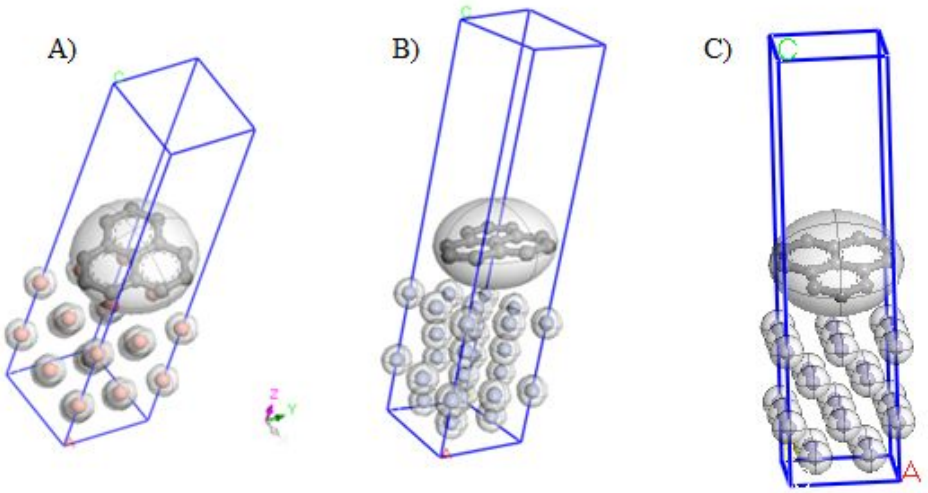

Figure S4. Simulated structures used in DFT computation of DOS for (a) copper with CNT, (b) chromium with CNT, and (c) tungsten with CNT.