Supplementary Information for

Enhanced solid-state electron transport via tryptophan containing peptide networks

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Materials and Methods

PND preparation and deposition – Both the preparation and deposition of the PND were conducted in a low humidity environment (chemical glovebox). FF and FW (Bachem) were dissolved in 1,1,1,3,3,3-hexafluoro-2-propanol at a concentration of 100 mg/ml, followed by a dilution with anhydrous MeOH to a final concentration of 2 mg/ml. ~10 µl of the diluted solution was drop-casted and dried on top of a mica or Au surface. Prior to deposition on mica, the outer surface of the mica was peeled off with a scotch tape to expose a clean new surface. A Si wafer (p type, boron doped, <100> single side polished, $\rho < 0.001$ Ω·cm) coated with 2 nm of Cr and 50 nm of Au was used for the deposition on the Au surface. Prior to the deposition on the Au surface, the Si coated wafer was cut to 1*1 cm^2 slides, cleaned for 10 min with UV/ozone treatment followed by a 30 min immersion in hot ethanol.

FF tubes preparation – FF was dissolved in 1,1,1,3,3,3-hexafluoro-2-propanol at a concentration of 100 mg/ml, followed by a dilution with ddH_2O to a final concentration of 2 mg/ml. Though the self-assembly process occurs within minutes, the solution was left on the bench for at least 2 h prior to deposition.

Scanning electron microscopy measurements - The FF tubes were deposited on Si/SiO_x surface. The sample was coated with palladium–gold, and scanned using a JSM JEOL 6300 scanning electron microscope operating at 5-10 kV.

AFM topography measurements - The mica surface was probed by a Digital Instrument (DI) MultiModeTM NanoScope IV AFM, using a Mikromasch NSC15/Si3N4 cantilever (resonant frequency f=325 kHz, spring constant k=40 N/m) in a tapping mode.

CP-AFM measurements – The Au surface was probed by a Solver P47 SPM system (ND-MDT, Zelenograd, Russia), using an all-metal Pt AFM probes with nominal force constant of 0.8 N/m (25PT300B, Rocky Mountain Nanotechnology) and a tip radius of 20 nm in a contact mode.

UV-Vis absorption – The UV-Vis absorption measurements were taken with a Cary 5000 UV-Vis-NIR Spectrophotometer, using a 0.1 cm quartz cuvette.

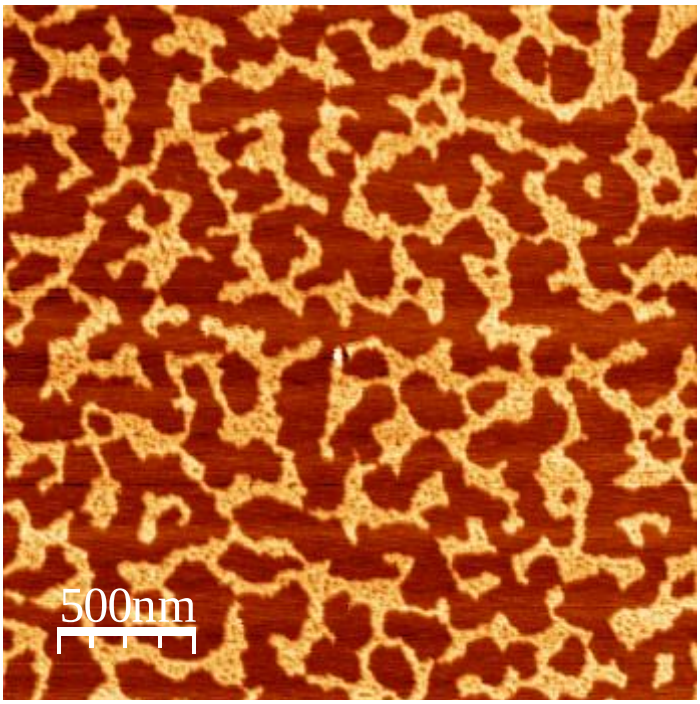

Figure S1. The morphology of a PND network composed of FW peptide.

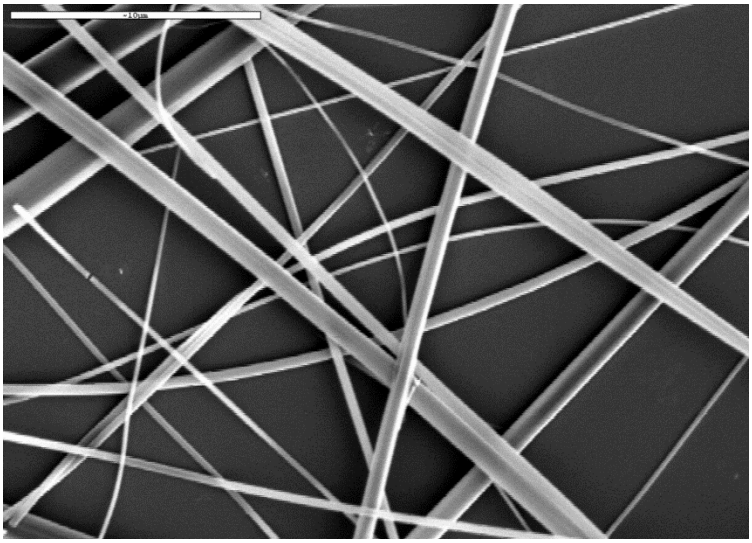

Figure S2. SEM image of FF tube formation.

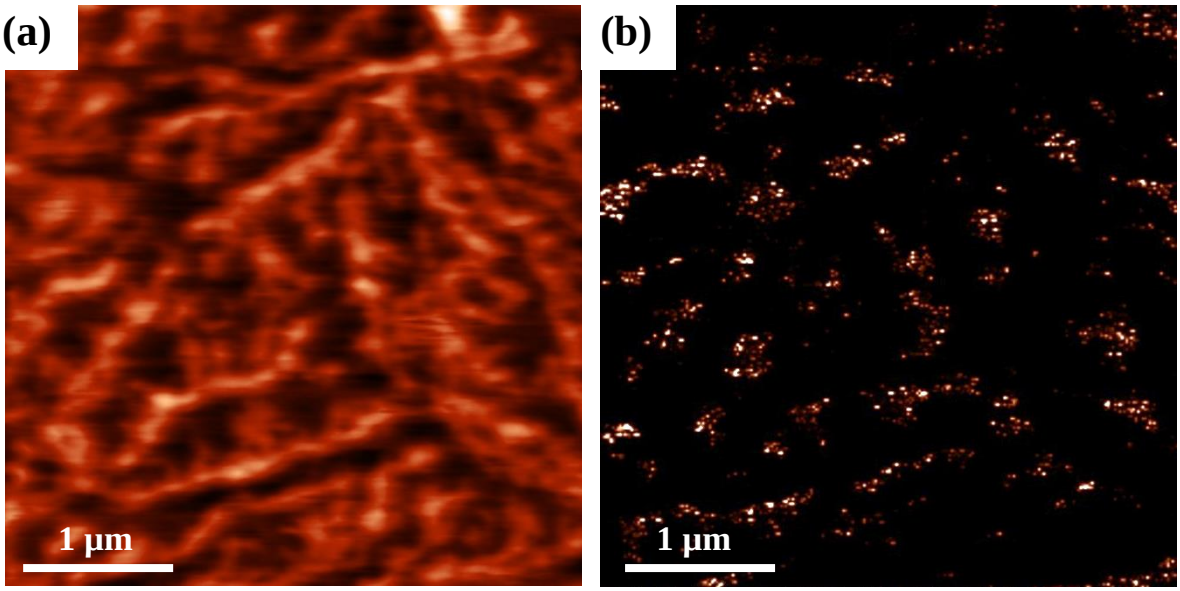

Figure S3. (a) The morphology and (b) the corresponded current map (tip bias=0.3V) of the FW PND network

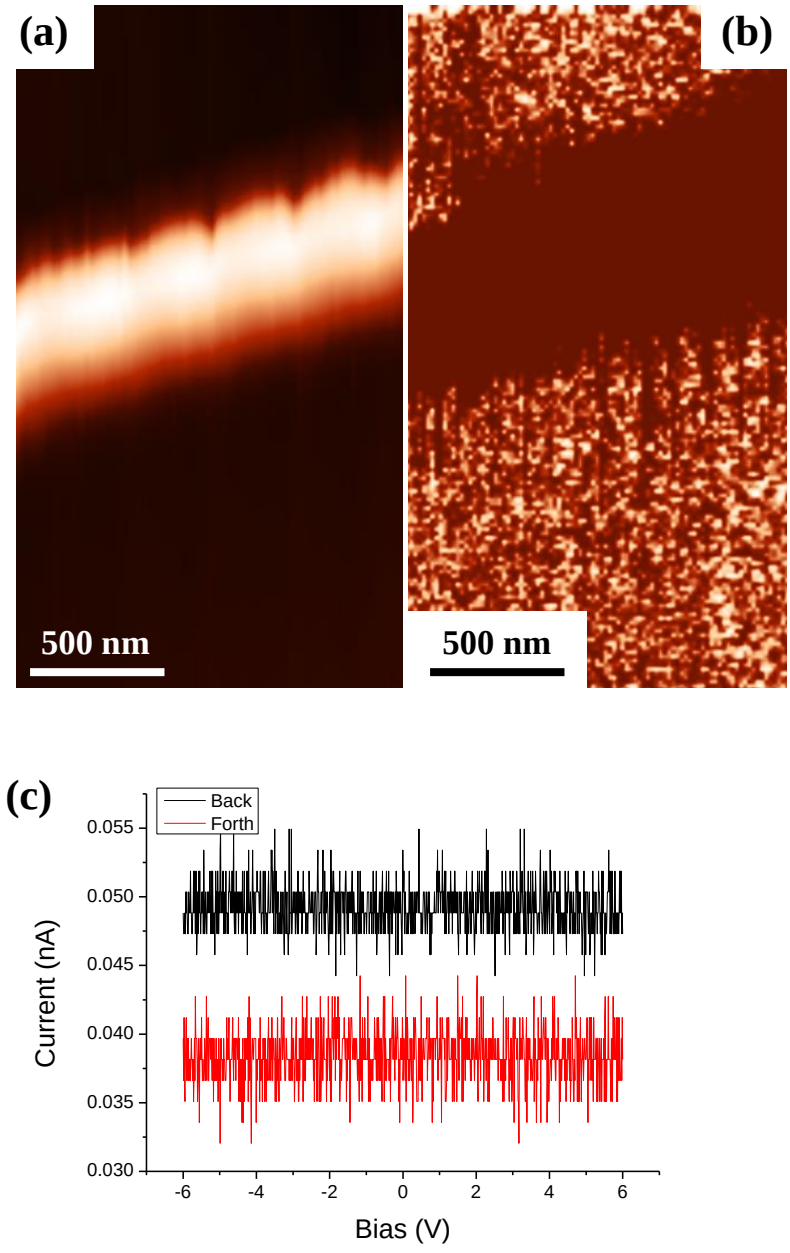

Figure S4. (a) Morphology, (b) current map and (c) single I-V of FF tube. The z-scales of (s) is 250 nm and (b) is 14 nA.

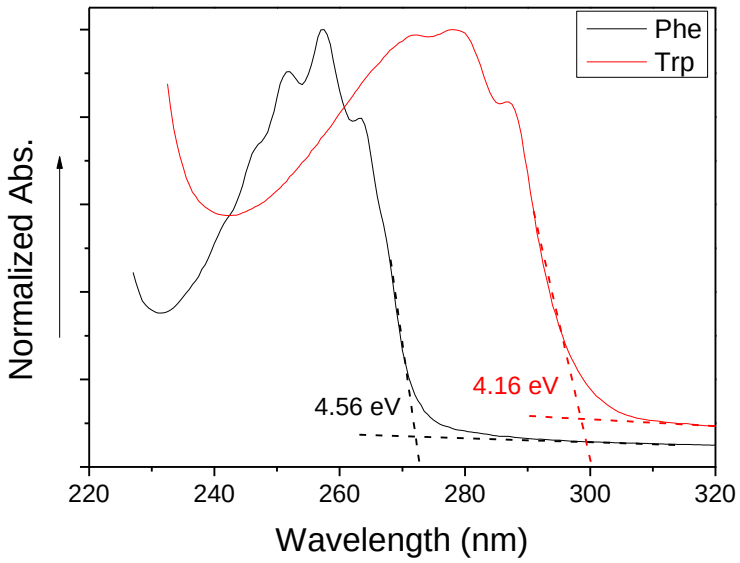

Figure S5. Normalized UV-Vis absorption spectrum of Phe and Trp in ddH_2O. The optical band-gap is illustrated.