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, ρ < 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 cm² 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 ddH₂O 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 (a) is 250 nm and (b) is 14 nA.
Figure S5. Normalized UV-Vis absorption spectrum of Phe and Trp in ddH$_2$O. The optical band-gap is illustrated.