Electrical conductivity of Self-assembling Peptide-semiconducting dye Conjugate nanofibre networks

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Electronic Supplementary Information

RP-HPLC analyses were performed using a Dionex Ultimate 3000 instrument (Sunnyvale, CA, USA) equipped with a 4 channel UV detector at 210, 230, 254, and 280 nm. The solvent system used was A (0.1% TFA in H2O) and B (0.1% TFA in MeCN). Characterization was performed by LC-MS using ESI in positive mode on an Agilent 1120 compact LC system equipped with Agilent 6120 Quadrupole MS and a UV detector at 214 nm (Palo Alto, CA, USA). The solvent system consisted of A (0.1% formic acid in H2O) and B (0.1% formic acid in MeCN).
ESI 1: RP-HPLC and ESI-MS traces of purified Ac-His-Glu-Phe-Ile-Ser-Thr-Ala-His-NH₂ (HEFISTAH) (ca. 99% as judged by the peak area of at 210 nm); XTerra® MS C18, (4.6 mm × 150 mm; 5 μm), a linear gradient of 5% B to 95% B over 30 min, ca. 3% B per minute at rt, 1.0 mL/min. m/z (ESI-MS) 982.4 ([M+H]+ expected 982.5)
ESI 2: RP-HPLC and ESI-MS traces of dimer-linked peptide dye conjugate (ca. 99% as judged by the peak area of RP-HPLC at 210 nm); XTerra®MS C18, (4.6 mm x 150 mm; 5 μm), a linear gradient of 5% B to 95% B over 30 min, ca. 3% B per minute at rt, 1.0 mL/min. m/z (ESI-MS) 1130.8 ([M+H]^{2+} expected 1129.9)
ESI 3: RP-HPLC and ESI-MS traces of mono linked peptide-dye conjugate (ca. 99% as judged by the peak area of RP-HPLC at 210 nm); XTerra® MS C18, (4.6 mm × 150 mm; 5 μm), a linear gradient of 5% B to 95% B over 30 min, ca. 3% B per minute at rt, 1.0 mL/min. m/z (ESI-MS) 1339.3 ([M+H]^+ expected 1337.5),
(a)

0 % RH

- Z imag (Ω) x 10^7
- Z real (Ω) x 10^7
- Peptide only
- Mono-conjugated sample
- Di-conjugated sample

(b)

~98-99% RH Air

- Z imag (Ω) x 10^8
- Z real (Ω) x 10^6
- Peptide only
- Mono-conjugated sample
- Di-conjugated sample

98 % - 99% RH Air

- Z imag (Ω) x 10^7
- Z real (Ω) x 10^7
- Peptide only
- Mono-conjugated sample
- Di-conjugated sample

Slope= -0.5
Slope= -0.67
Slope= -0.75
- For ~98-99% RH N₂:
  - Peptide only
  - Mono-conjugated sample
  - Di-conjugated sample

- Frequency (Hz)

- For Dry N₂:
  - Peptide only
  - Mono-conjugated sample
  - Di-conjugated sample

- Z imag (Ω) x 10^7
- Z real (Ω) x 10^7
- Slope = -1

- Slope = 0.67
- Slope = 0.83
Result of EIS studies at different atmospheric conditions. (a) Nyquist plot and Bode plots at 0 % RH (b) Nyquist plot and Bode plots at 98 – 99 % RH in the air (c) Nyquist plot and Bode plots at 98 – 99 % RH in N₂ atmosphere (d) Nyquist plot and Bode plots at Dry N₂ atmosphere (e) Nyquist plot and Bode plots Dry air. The dashed lines show the limiting slopes for impedance.