Supplementary Information

1. Scanning Tunneling Microscopy images of self assembled monolayers of ZnOEP/BP molecular wires

1.1 Monolayer 1 – ZnOEP over HOPG

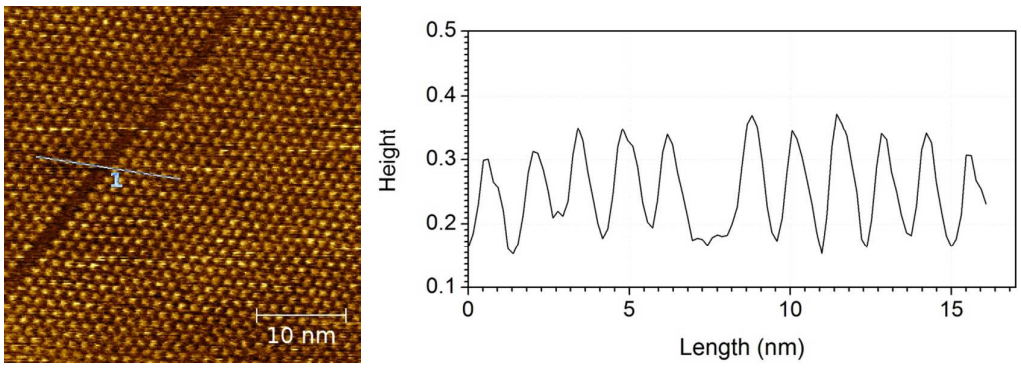


Figure S1.1 STM image (39x39nm^2, I_t = 24 pA, U_t = 550 mV) of a full packed monolayer of zinc octaethylporphyrin (ZnOEP) over high pyrolitic oriented graphite (HOPG). The line profile shows porphyrins positioned in parallel stripes. The region with less signal is a stripe without porphyrins.

1.2 Monolayer 2: BP molecules over ZnOEP

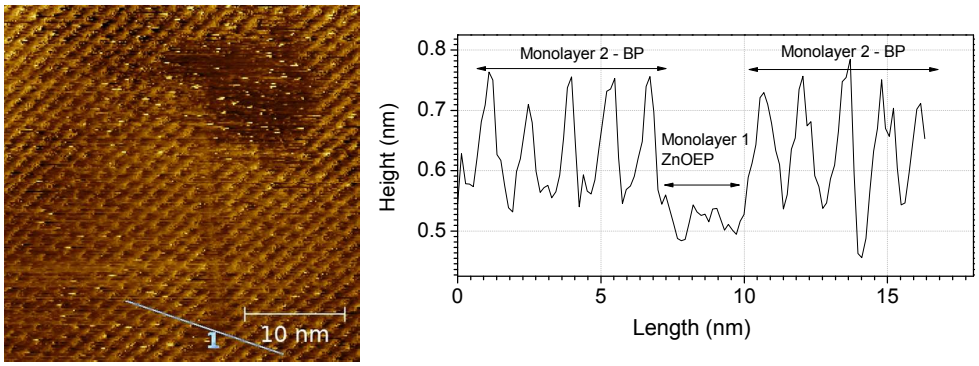


Figure S1.2 – STM image (35x35nm^2, I_t = 205 pA, U_t = 400 mV) of a full packed monolayer of bipyridine over monolayer 1. The line profile shows an incomplete region were is possible to see the porphyrins of monolayer before.

1.3 Monolayer 3: ZnOEP molecules over Monolayer 2

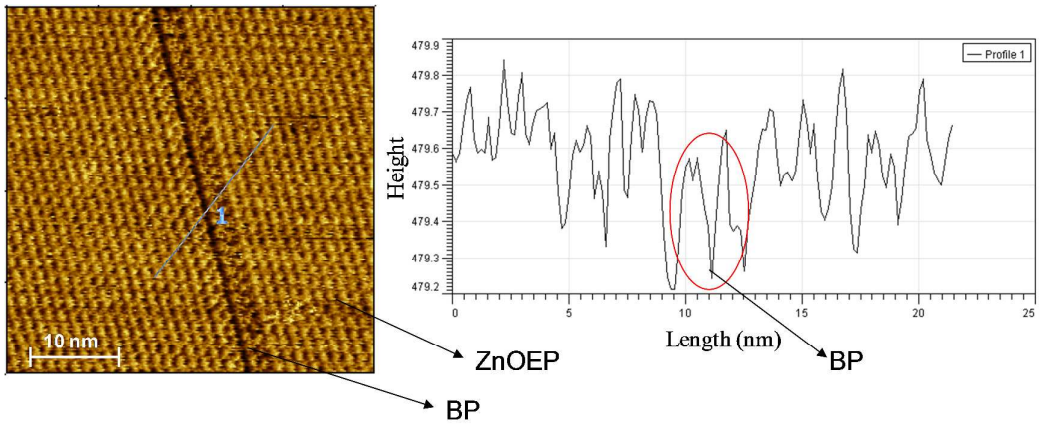


Figure S1.3 – STM image (40x40nm^2, I_t = 221 pA, U_t = 400 mV) of Monolayer 3 composed by ZnOEP molecules. In the line profile the blue arrow indicates the monolayer 3 with porphyrins with a region with less signal that correspond to the monolayer 2 composed by bipyridines of monolayer 2

1.4 Monolayer 4: BP molecules over Monolayer 3

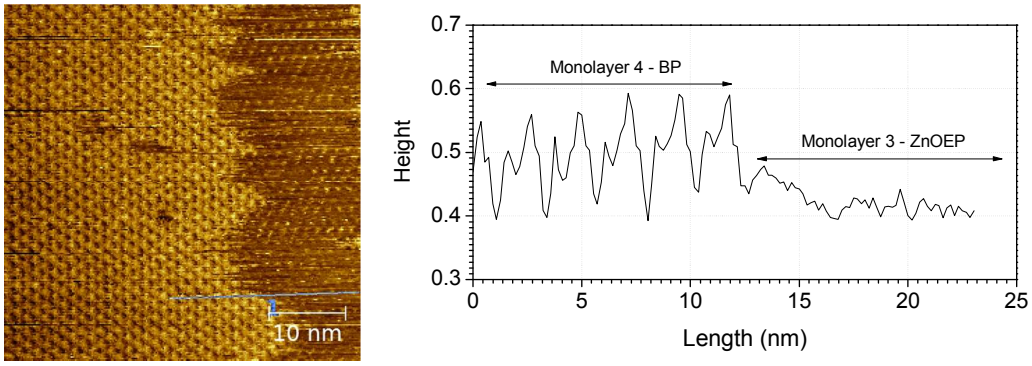


Figure S1.4 – The STM image (46x46nm^2, I_t = 117 pA, U_t = 450 mV) show two regions with different signals. The region with brighter domains corresponds to the monolayer 4 composed by bipyridines and the other correspond to the monolayer before composed by porphyrins**.**

1.5 Monolayer 5: ZnOEP molecules over monolayer 4

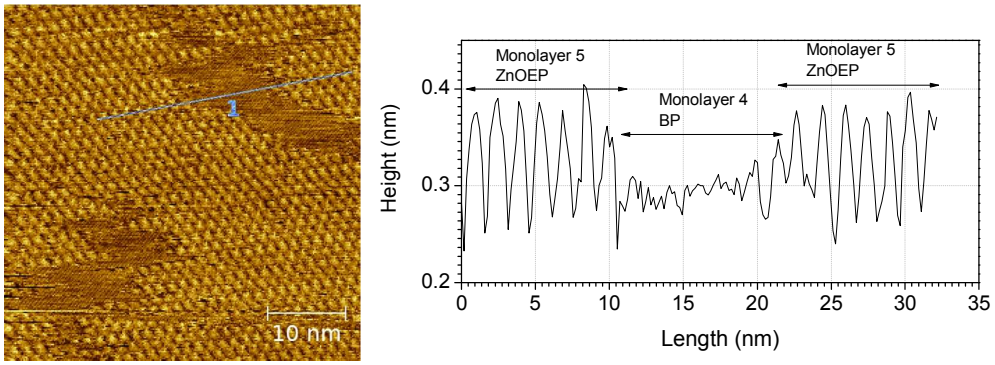


Figure S1.5 – STM image (45x45nm^2, I_t = 213 pA, U_t = 600 mV) of an incomplete monolayer of porphyrins. The line profile shows a region with bipyridines of the monolayer before

1.6 Monolayer 6: BP molecules over monolayer 5

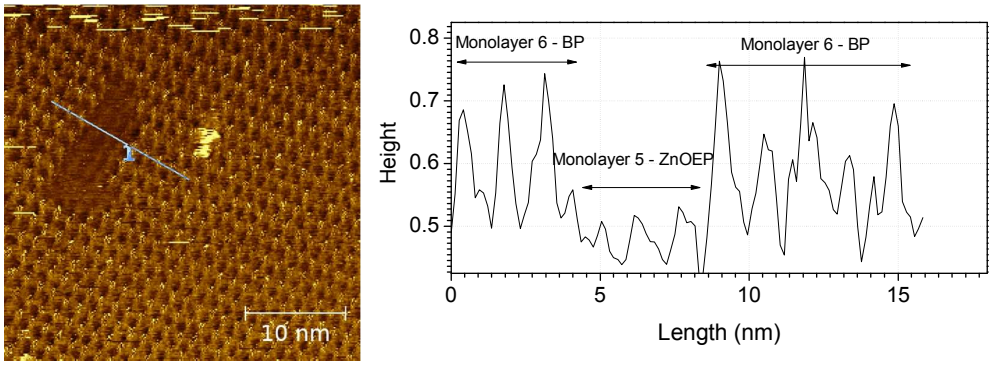


Figure S1.6 – STM image (35x35nm^2, I_t = 217 pA, U_t =540 mV) of an incomplete monolayer of bipyridines. The line profile shows a region with porphyrins of the monolayer before

1.7 Monolayer 7: ZnOEP molecules over monolayer 6

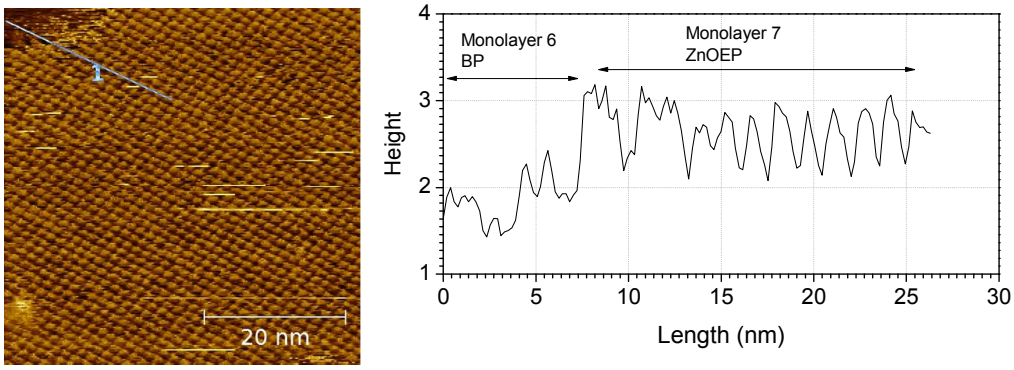


Figure S1.7 – STM image (50x50nm^2, I_t = 217 pA, U_t =540 mV) of an incomplete monolayer of ZnOEP. The line profile shows a region with bipyridines of the monolayer before

1.8 Monolayer 8: BP molecules over monolayer 7

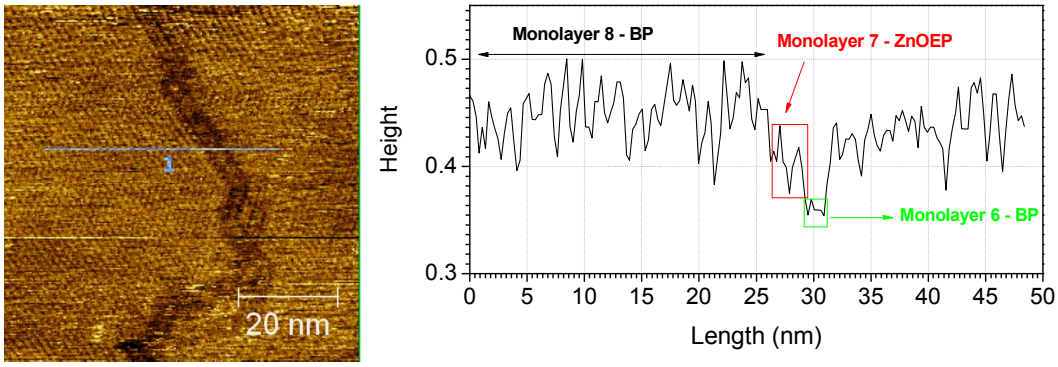


Figure S1.8 – STM image (70x70nm^2, I_t = 10 pA, U_t =460 mV) of an incomplete monolayer composed by bipyridines. The line profile shows the 2 monolayers before: monolayer 7 with ZnOEP molecules marked with a red square in the line profile and monolayer 6 marked by a green square.

1.9 Monolayer 9: BP molecules over monolayer 8

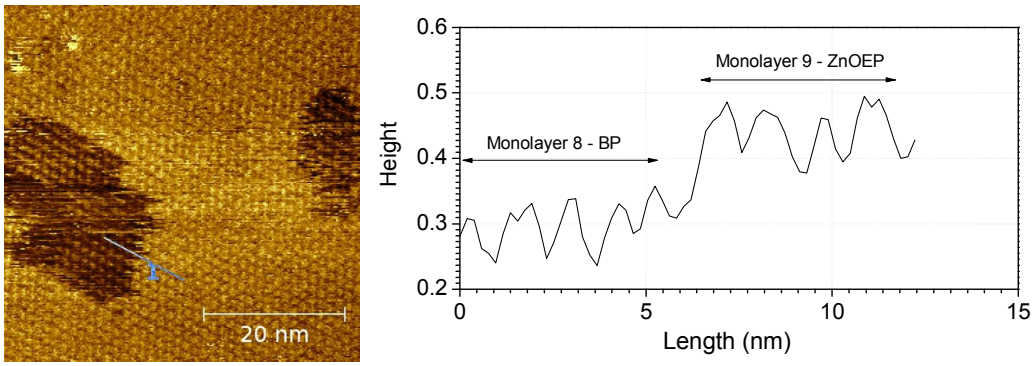


Figure S1.9 – STM image (50x50nm^2, I_t = 39 pA, U_t =590 mV) of an incomplete monolayer composed by porphyrins where the line profile shows the bipyridines of the monolayer before.

1.10 Monolayer 10: BP molecules over monolayer 9

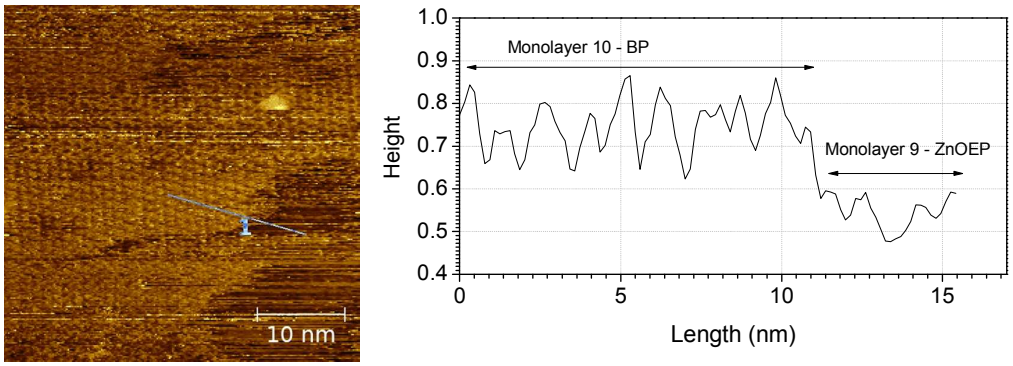


Figure S1.10 – STM image (40x40nm^2, I_t = 54 pA, U_t =590 mV) of an incomplete monolayer composed by porphyrins and a region with bipyridines of the monolayer before marked in the graphic of line profile.

1.11 Monolayer 11: ZnOEP molecules over monolayer 10

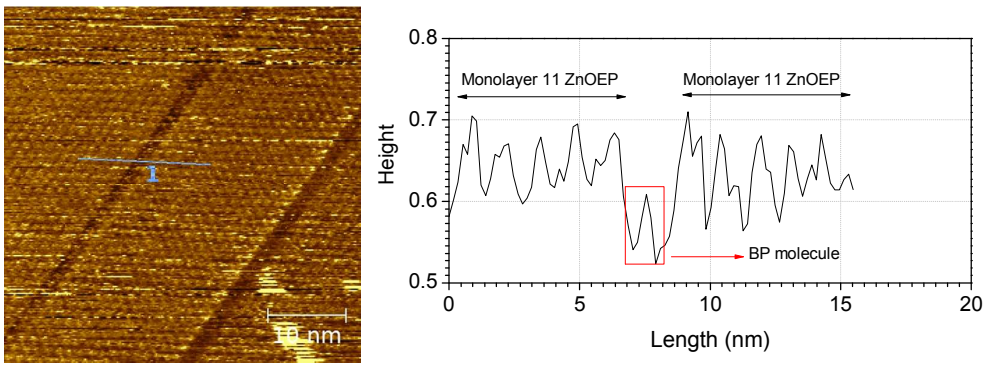


Figure S1.11 – STM image (45x45nm^2, I_t = 100 pA, U_t =660 mV) of porphyrins of monolayer 11. The image has two stripes with less current signal that show the bipiridines of monolayer before and one of the stripes is evidenced in line profile graphic.

1.12 Monolayer 12: BP molecules over monolayer 11

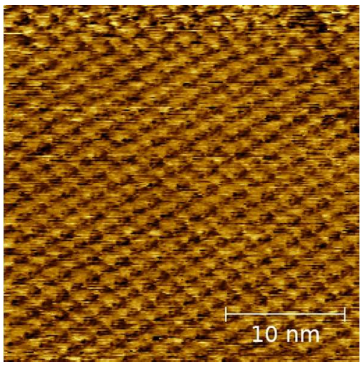


Figure S1.12 – STM image (30x30nm^2, I_t = 137 pA, U_t =1.1 V) of a full packed monolayer of bipyridine.

1.13 Monolayer 13: ZnOEP molecules over monolayer 12

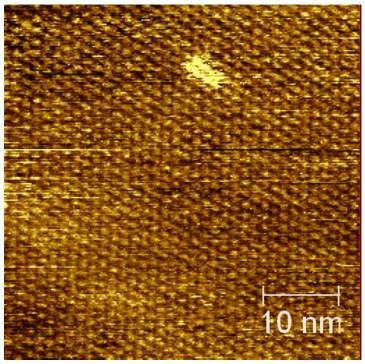


Figure S1.13 – STM image (46x46nm^2, I_t = 79 pA, U_t =1 V) of a full packed monolayer of porphyrin of monolayer 13.

1.14 Monolayer 14: BP molecules over monolayer 13

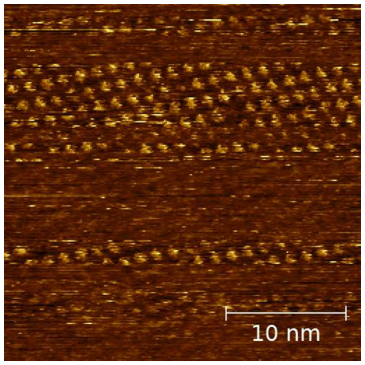


Figure S1.14 – STM image (29x29nm^2, I_t = 205 pA, U_t =950 mV) of a full packed monolayer of bipyridines molecules of monolayer 13.

1.15 Monolayer 15: ZnOEP molecules over monolayer 14

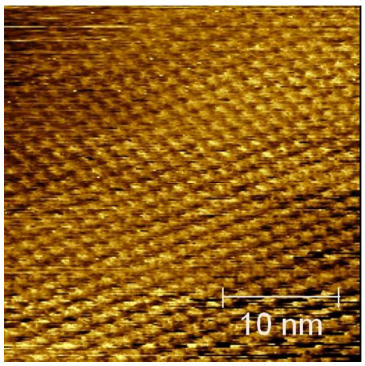


Figure S1.15 – STM image (30x30nm^2, I_t = 116 pA, U_t =850 mV) of a full packed monolayer composed by porphyrines over monolayer 14

1.16 Monolayer 16: BP molecules over monolayer 15

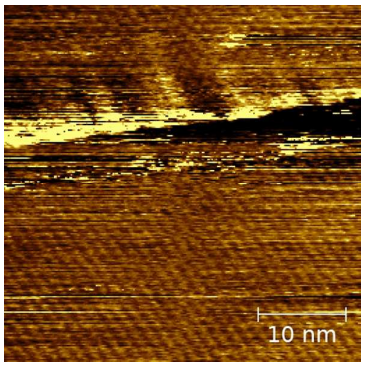


Figure S1.16 – STM image (40x40nm^2, I_t = 115 pA, U_t =1.02 V) that shows a full packed monolayer of bipyridines over porphyrin molecules.

1.17 Monolayer 17: ZnOEP molecules over monolayer 16

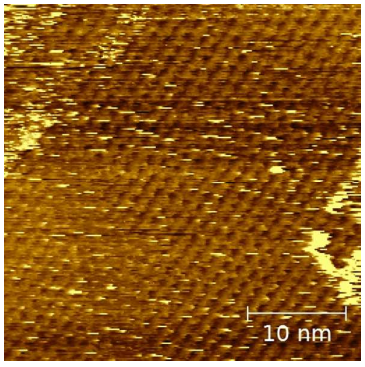


Figure S1.17 – STM image (36x36nm^2, I_t = 79 pA, U_t =970 mV) that represents a full packed monolayer composed by porphyrins molecules over monolayer 16

1.18 Monolayer 18: BP molecules over monolayer 17

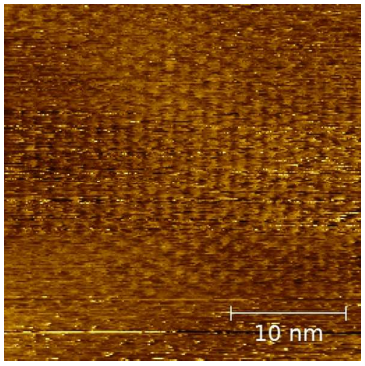


Figure S1.18 – STM image (31x31nm^2, I_t = 115 pA, U_t =1.34 V) that represents a monolayer composed by bipyridines molecules over porphyrins

1.19 Monolayer 19: ZnOEP molecules over monolayer 18

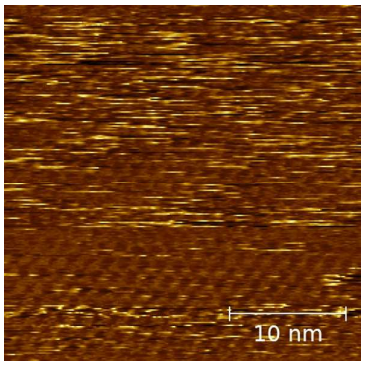


Figure S1.19 – STM image (30x30nm^2, I_t = 122 pA, U_t =1.01 V) that represents a full packed monolayer composed by porphyrins molecules over bipyridines

1.20 Monolayer 20: BP molecules over monolayer 19

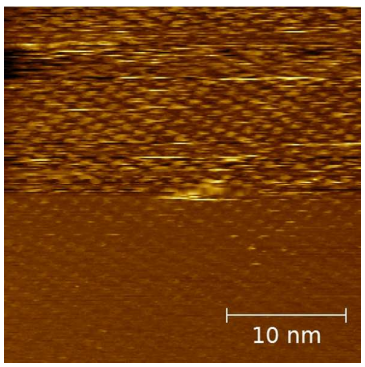


Figure S1.20 – STM image (30x30nm^2, I_t = 112 pA, U_t =1.05 V) that represents a monolayer composed by bipyridines

1.21 Monolayer 21: BP molecules over monolayer 20

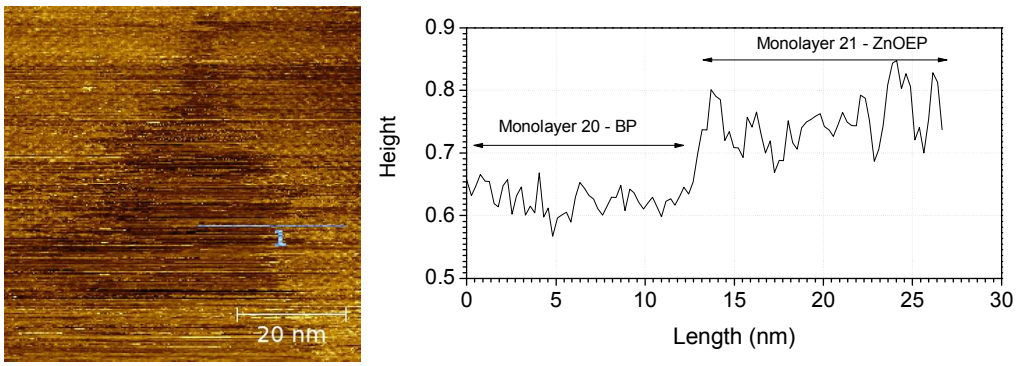


Figure S1.21 – STM image (65x65nm^2, I_t = 100 pA, U_t =980 mV) that represents an incomplete monolayer where the graphic of line profile evidences the presence of the porphyrins of monolayer 21 and a region with less current signal that correspond to the monolayer 20 composed by bipyridines.

1.22 Monolayer 22: BP molecules over monolayer 21

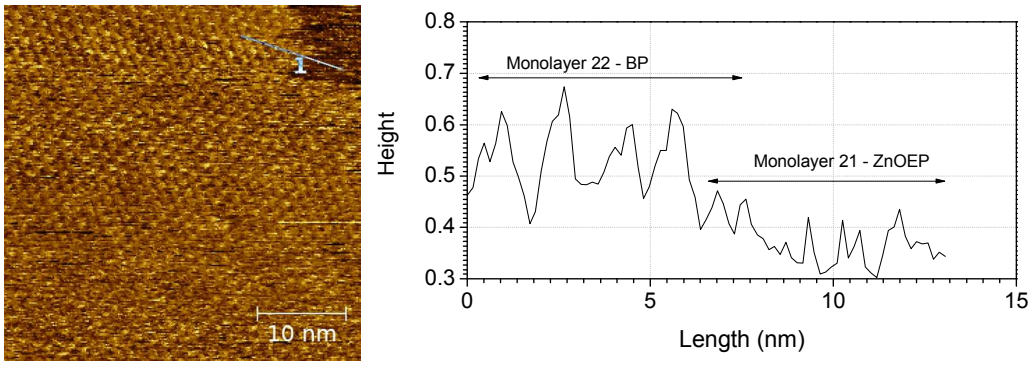
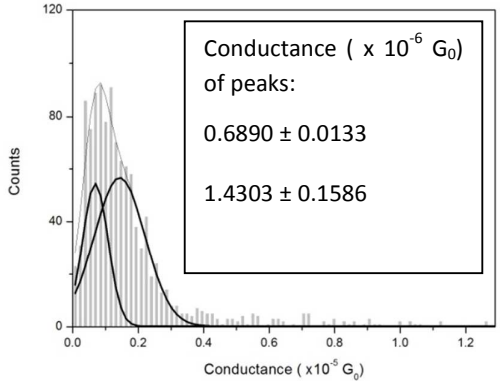
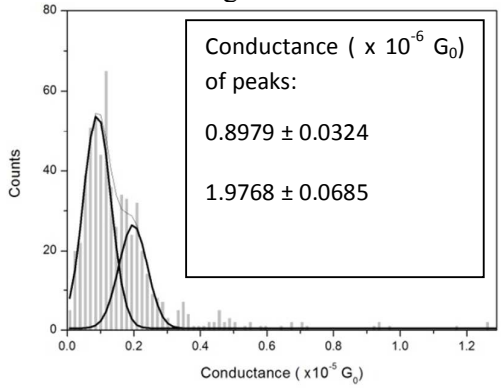
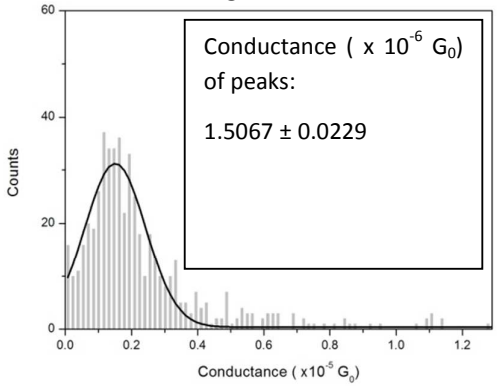
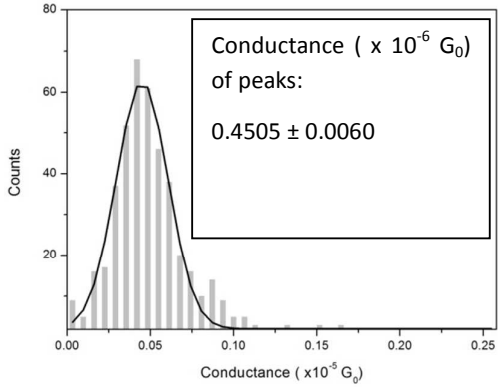
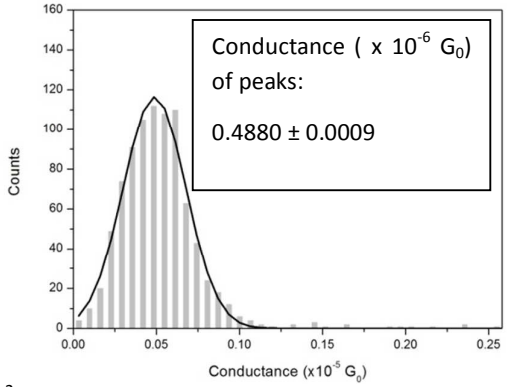
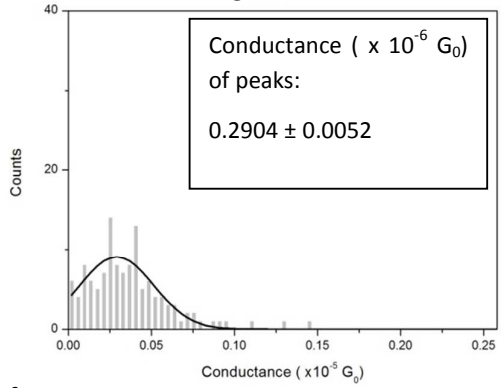
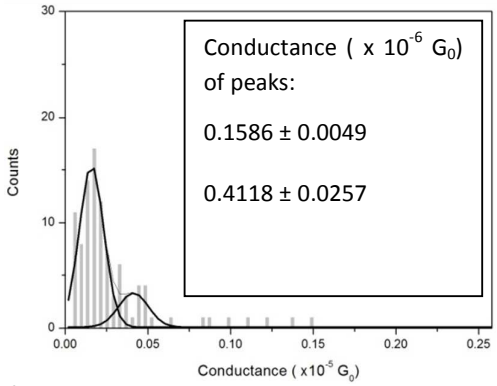


Figure S1.22 – STM image (40x40nm^2, I_t = 33 pA, U_t =1.51 V) showing a incomplete monolayer composed by bipyridines and with a smaller region composed by porphyrins evidenced in the graphic of line profile.

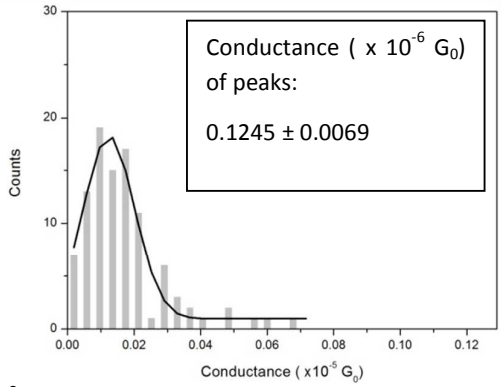
2. Scanning Tunneling Spectroscopy of porphyrins monolayers

Table S2.1

Conductance histograms of porphyrins monolayers obtained from the ohmic region of I-V curves analyzed by scanning tunneling spectroscopy.	
Monolayer 3 Molecular wire length = 1.69 nm  r^2 (Gaussians fitting) =0.98	Monolayer 5 Molecular wire length = 2.91 nm  r^2 (Gaussians fitting) = 0.97
Monolayer 7 Molecular wire length = 4.16 nm  r^2 (Gaussians fitting) = 0.93	Monolayer 9 Molecular wire length = 5.42 nm  r^2 (Gaussians fitting) = 0.87
Monolayer 11 Molecular wire length = 6.58 nm  r^2 (Gaussians fitting) = 0.99	Monolayer 15 Molecular wire length = 9.19 nm  r^2 (Gaussians fitting) = 0.90
Monolayer 17 Molecular wire length = 10.45 nm	Monolayer 19 Molecular wire length = 11.7 nm

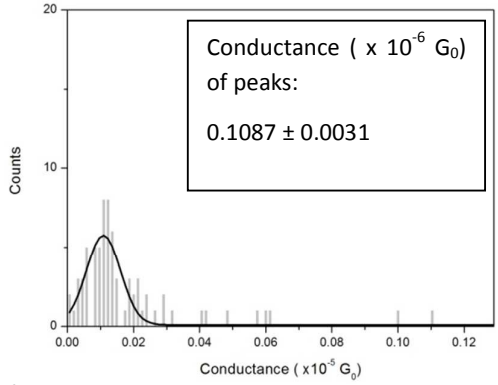


r^2 (Gaussians fitting) = 0.92



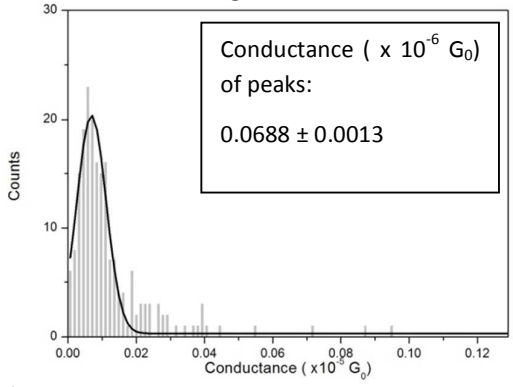
r^2 (Gaussians fitting) = 0.92

Monolayer 21
Molecular wire length = 12.95 nm



r^2 (Gaussians fitting) = 0.73

Monolayer 23
Molecular wire length = 14.21 nm



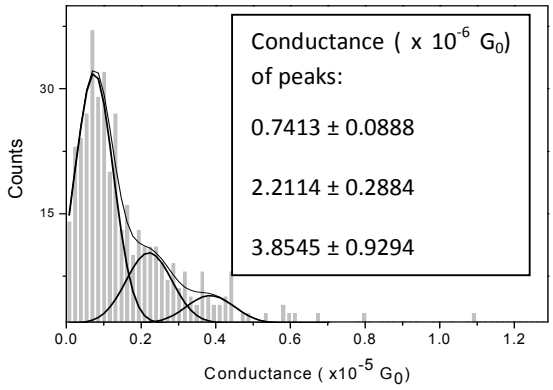
r^2 (Gaussians fitting) = 0.94

3. Scanning Tunneling Spectroscopy of bipyridine monolayers

Table S3.1

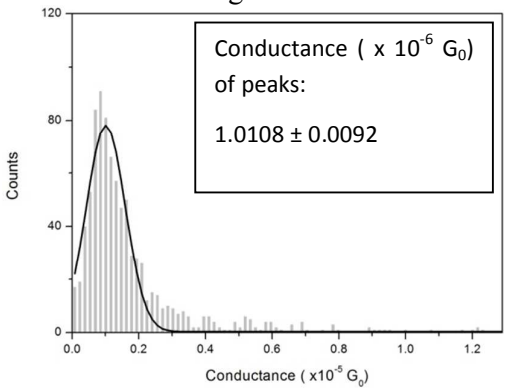
Conductance histograms of bipyridine monolayers obtained from the ohmic region of I-V curves analyzed by scanning tunneling spectroscopy.

Monolayer 2
Molecular wire length = 1.19 nm



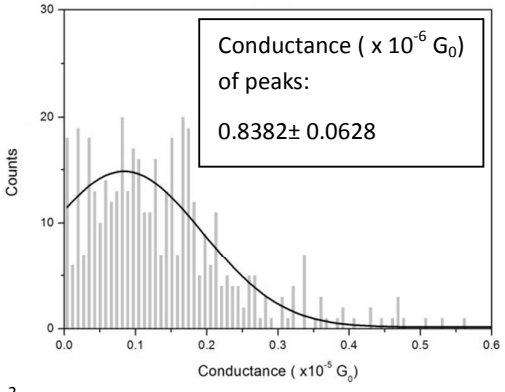
r^2 (Gaussians fitting) = 0.95

Monolayer 4
Molecular wire length = 2.41nm



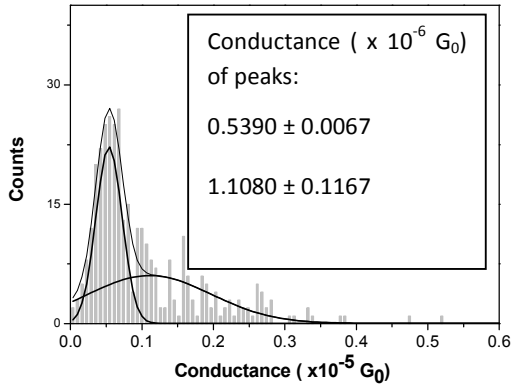
r^2 (Gaussians fitting) = 0.95

Monolayer 6
Molecular wire length = 3.66 nm



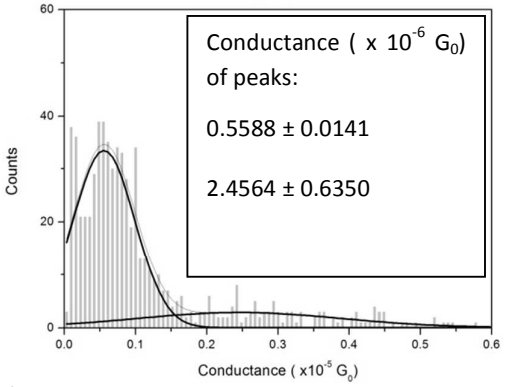
r^2 (Gaussians fitting) = 0.86

Monolayer 8
Molecular wire length = 4.92 nm



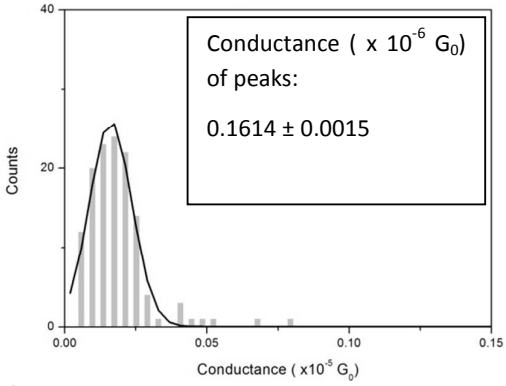
r^2 (Gaussians fitting) = 0.95

Monolayer 10
Molecular wire length = 6.08nm



r^2 (Gaussians fitting) = 0.91

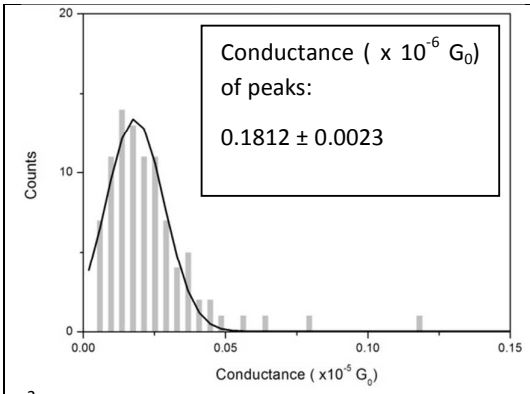
Monolayer 12
Molecular wire length = 7.43 nm



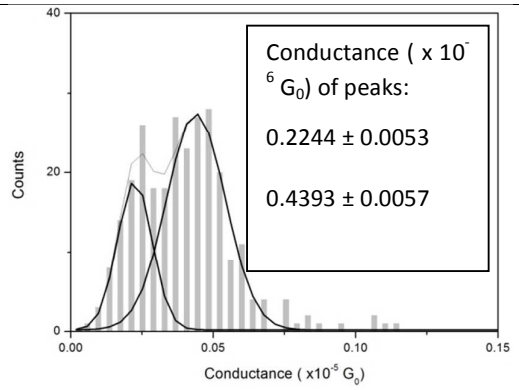
r^2 (Gaussians fitting) = 0.97

Monolayer 14
Molecular wire length = 8.69 nm

Monolayer 16
Molecular wire length = 9.95 nm

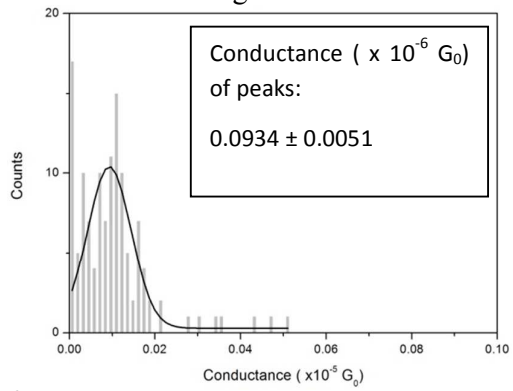


r^2 (Gaussians fitting) = 95



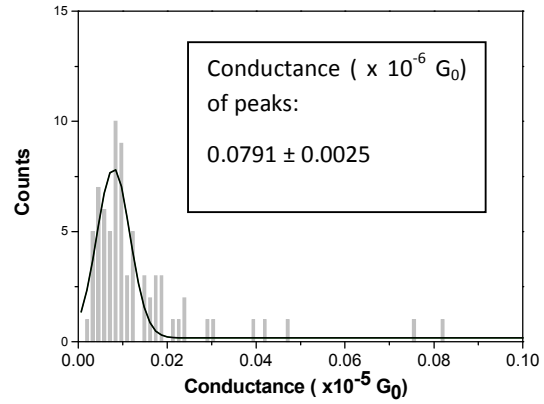
r^2 (Gaussians fitting) = 0.97

Monolayer 18
Molecular wire length = 11.20 nm



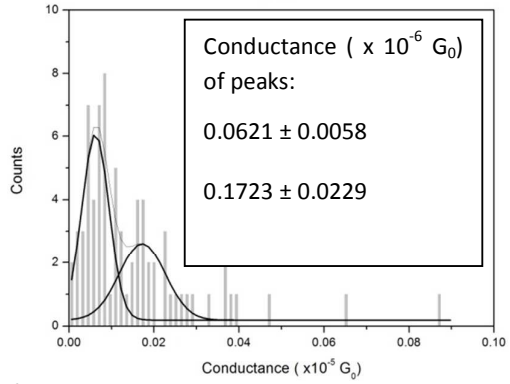
r^2 (Gaussians fitting) = 0.79

Monolayer 20
Molecular wire length = 12.46 nm



r^2 (Gaussians fitting) = 0.84

Monolayer 24
Molecular wire length = 14.97 nm



r^2 (Gaussians fitting) = 0.77