

Supporting Information

Tunable Assembly of Biomimetic Peptoids as Templates to Control Nanostructure Catalytic Activity

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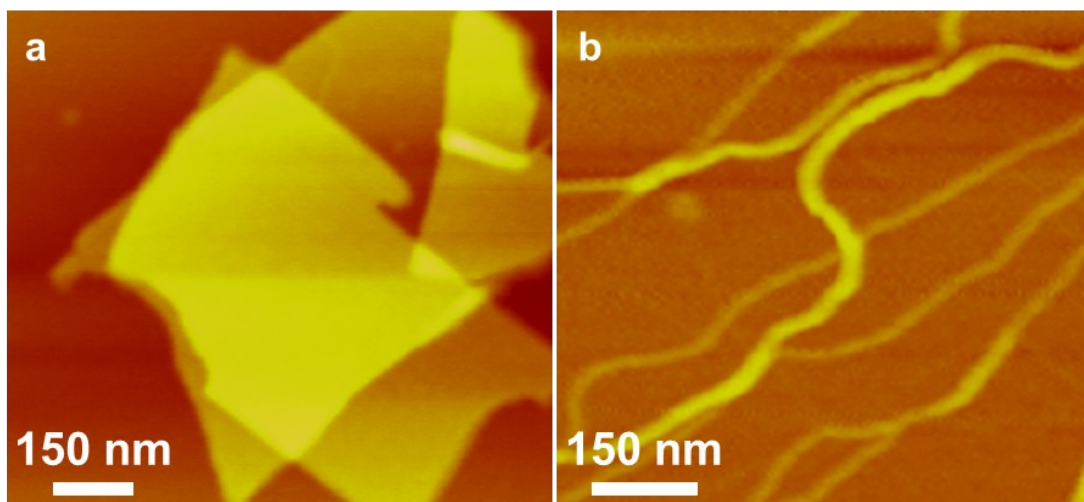


Figure S1. AFM images showing the (a) 2D membranes and (b) 1D fibers assembled from $\text{Pep}_{\text{Pd-1}}$ at pH 2.1 and 5.6, respectively.

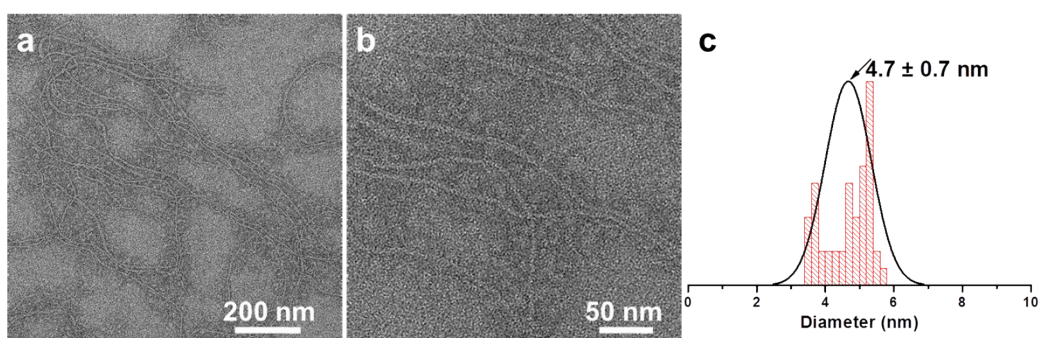


Figure S2. (a and b) TEM images of fibers assembled from $\text{Pep}_{\text{Pd-1}}$ at pH 5.6. (c) Statistical size distribution of fiber diameter according to the TEM images. The histogram-determined average diameter of $4.7 \pm 0.7 \text{ nm}$ (50 fibers were analyzed for the size distribution) is comparable to the 4.1 nm measurement from XRD.

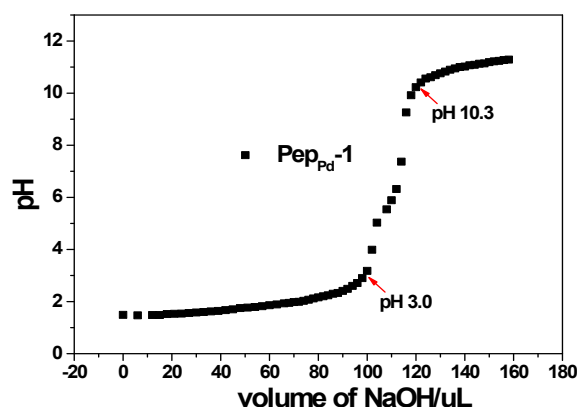


Figure S3. Acid-base titration curve of $\text{Pep}_{\text{Pd-1}}$. The titration curve for $\text{Pep}_{\text{Pd-1}}$ was performed on an SevenCCompct™ pH/Ion meter S220. Because $\text{Pep}_{\text{Pd-1}}$ is not soluble in water, for this titration study, 2 μmol of $\text{Pep}_{\text{Pd-1}}$ were dissolved in the mixture of 1.0 mL of H_2O and 15 μL of 2.0 M NaOH. 125 μL of the resulting clear solution was further diluted with 125 μL of H_2O to obtain the 1.0 mM $\text{Pep}_{\text{Pd-1}}$ aqueous solution. After adding 16 μL of 1.0 M HCl into this 1.0 mM peptoid solution, aqueous NaOH (0.1 M) was stepwise added to adjust the pH in the titration process. The point before pH 3.0 is probably where all carboxyl groups of $\text{Pep}_{\text{Pd-1}}$ are protonated. The region from pH 3.0 to pH 10.3 is where the carboxyl groups of $\text{Pep}_{\text{Pd-1}}$ start to become partially and then fully deprotonated.

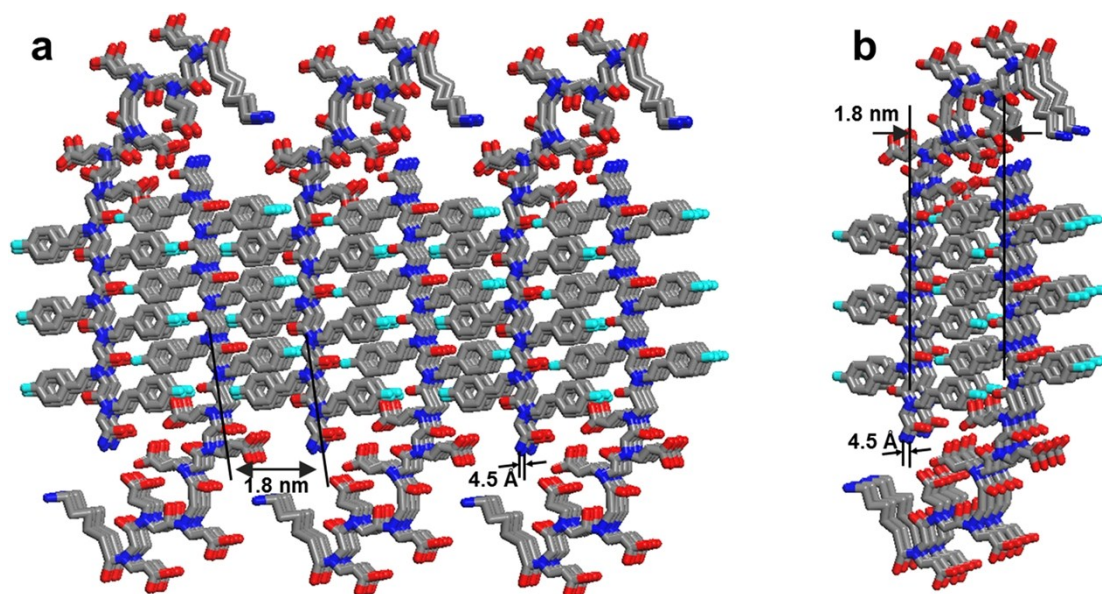


Figure S4. Molecular model showing proposed packing of $\text{Pep}_{\text{Pd-1}}$ inside membranes (a) and fibers (b), in which the peptoid backbone to backbone distance is 4.5 Å along one direction and ~ 1.8 nm along another direction; the hydrophilic domains of $\text{Pep}_{\text{Pd-1}}$ are disordered and they are flexible and bulky enough to cover $\text{Pep}_{\text{Pd-1}}$ hydrophobic domains to form the membranes and fibers.

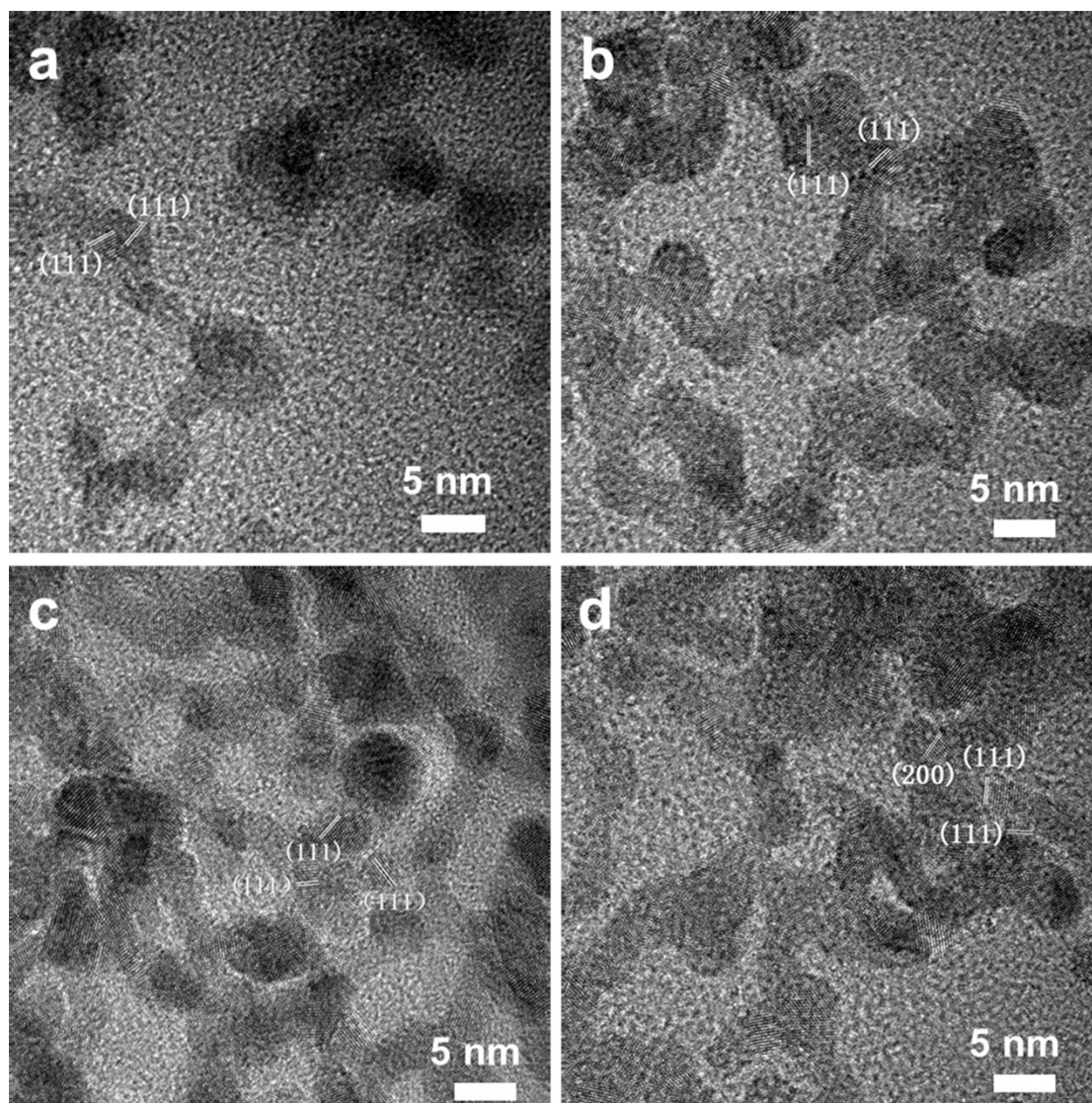


Figure S5: HR-TEM images for the (a) M-Pd50, (b) M-Pd60, (c) M-Pd70, and (d) M-Pd80 nanomaterials.

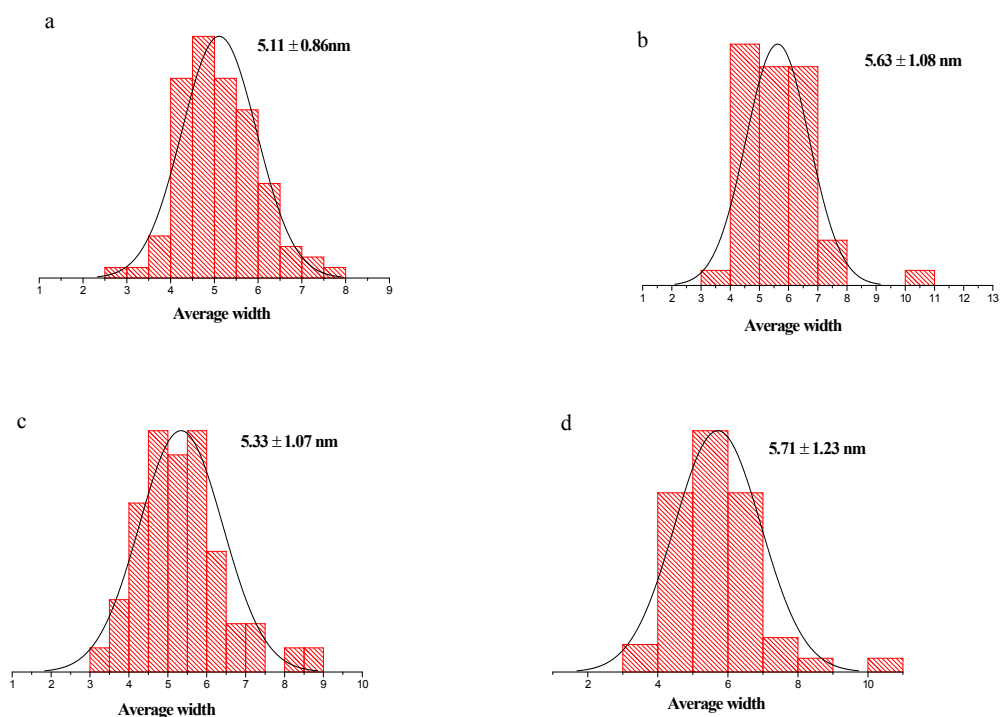


Figure S6: Statistical average width of Pd nanomaterials templated by the peptoid-membrane: (a) M-Pd50 (98 counts), (b) M-Pd60 (100 counts), (c) M-Pd70 (102 counts), and (d) M-Pd80 (100 counts) according to the TEM images. An average width and standard deviation were determined for each sample using the indicated number of individual nanomaterial samples.

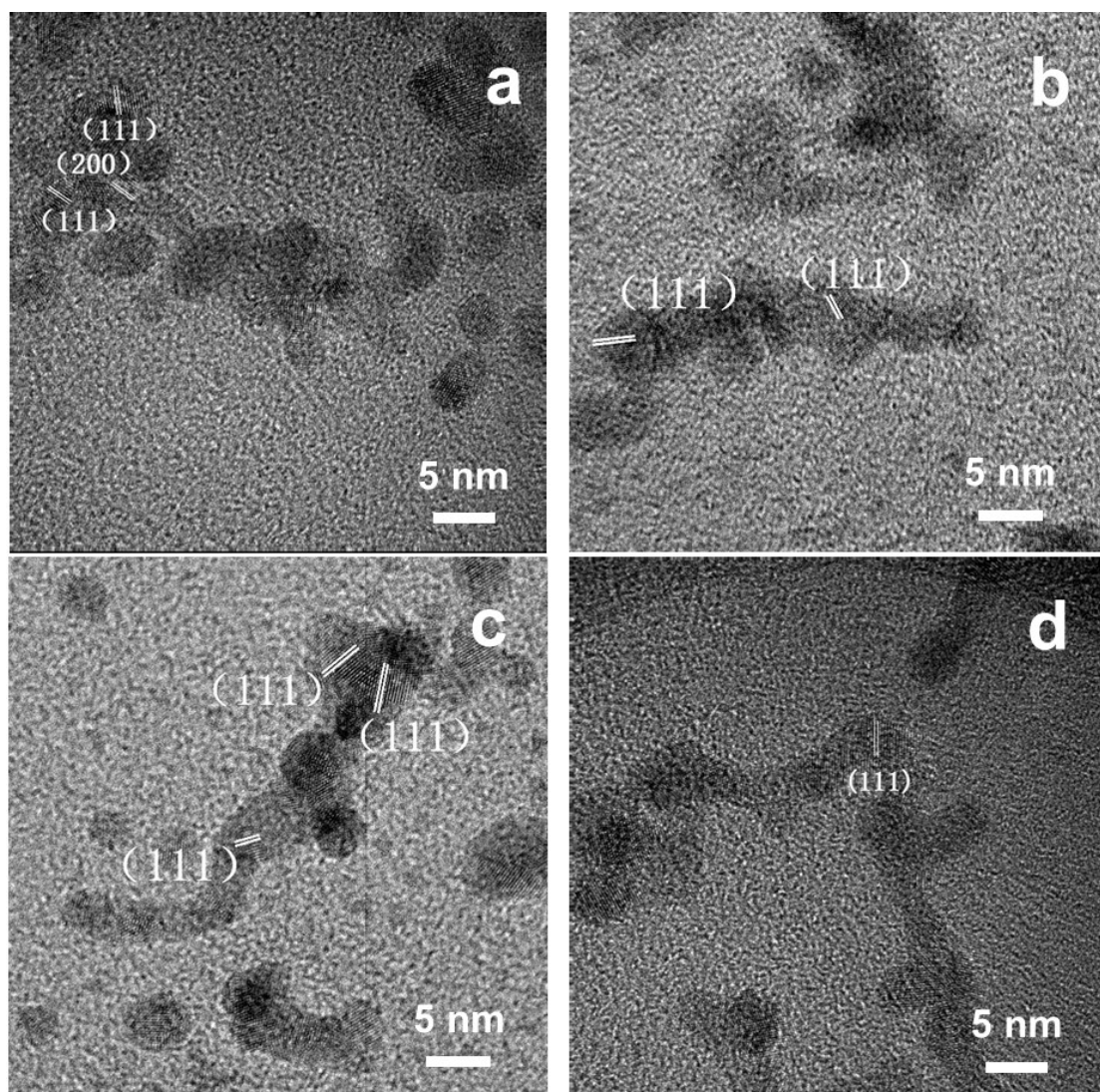


Figure S7: HR-TEM images for the (a) F-Pd50, (b) F-Pd60, (c) F-Pd70, and (d) F-Pd80 nanomaterials.

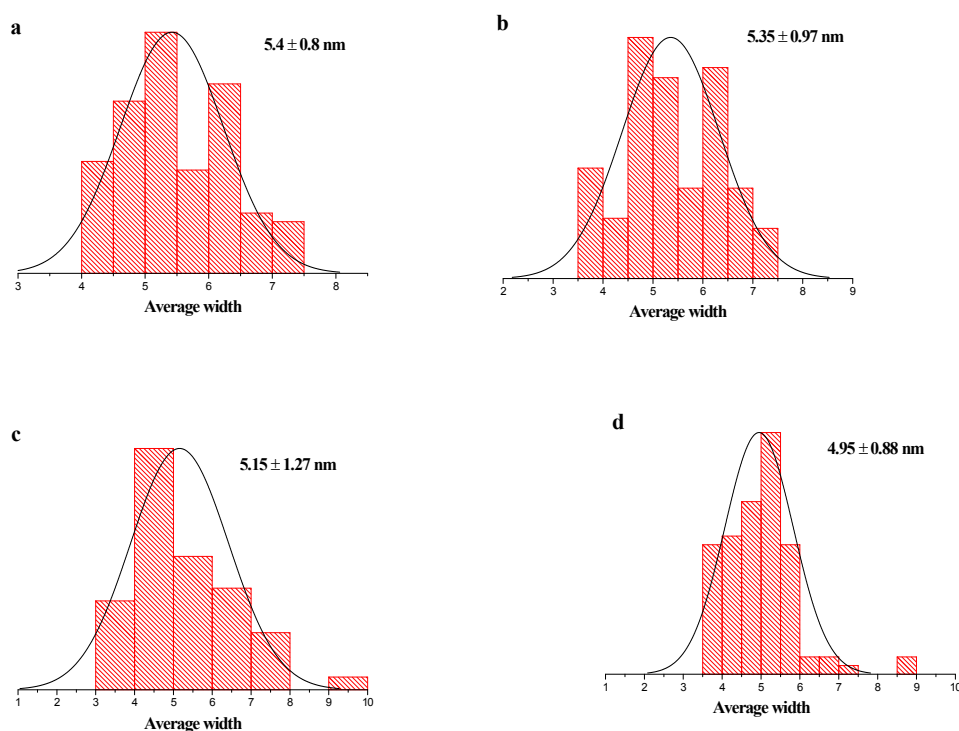


Figure S8: Statistical average width of Pd nanomaterials templated by the peptoid-membrane: (a) F-Pd50 (108 counts), (b) F-Pd60 (105 counts), (c) F-Pd70 (100 counts), and (d) F-Pd80 (101 counts) according to the TEM images. An average width and standard deviation were determined for each sample using the indicated number of individual nanomaterial samples.

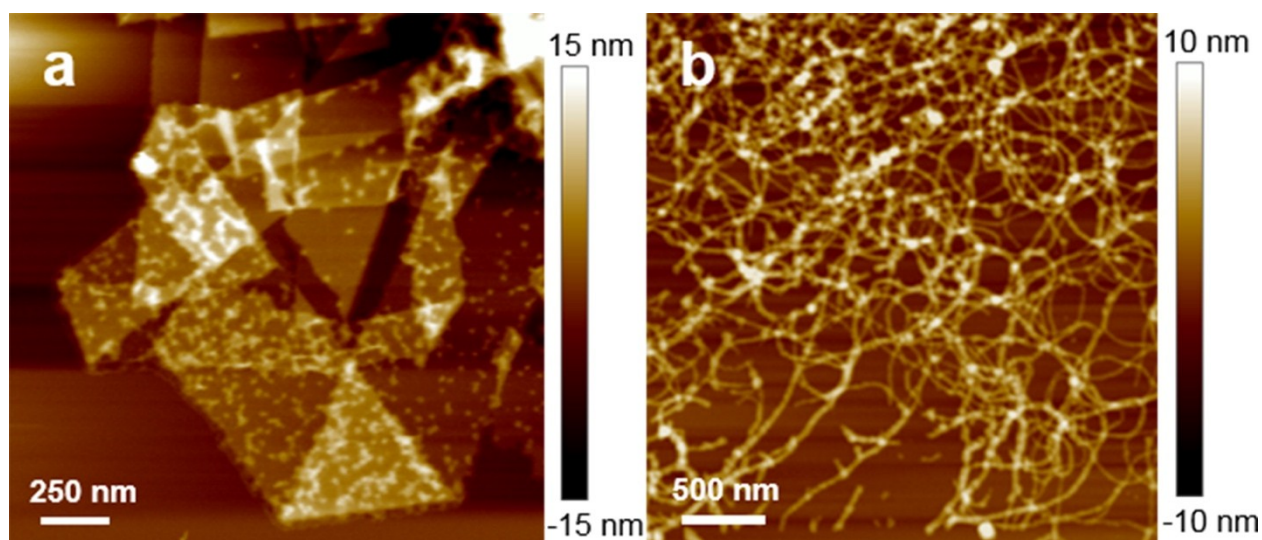


Figure S9. AFM images showing the (a) 2D membranes and (b) 1D fibers after being incubated with Na_2PdCl_4 ; the observation of particle-like features on both membranes and fibers indicates the high binding affinity of these peptoid-based templates toward Pd^{2+} ions.