Nanofibers generated by spontaneous self-assembly on surfaces of individual bimetallic building blocks

Rubén Mas-Ballesté, Rodrigo González-Prieto, Alejandro Guijarro, Miguel A. Fernández-Vindel, Felix Zamora*
Experimental Procedure

Materials. All chemicals were of reagent grade and were used as commercially obtained. Compound [Pt$_2$(dta)$_4$] ($dta$= dithioacetate) was obtained according to a previously reported procedure$^1$.

Preparation of the Substrates for AFM. In order to obtain reproducible results, very flat substrates with precisely controlled chemical functionalities, freshly prepared just before the chemical deposition, were used. Two different commercially available supports were used: Muscovite Mica and Highly Oriented Pyrolytic Graphite (HOPG). Both of them were cleaved with adhesive tape.

Sample Preparation

Method (a).- 20 μl and 40 μl of freshly prepared $10^{-10}$ M solutions of [Pt$_2$(dta)$_4$] in CH$_2$Cl$_2$ were deposited on mica and HOPG, respectively at room temperature and without any previous treatment. Upon standing these solutions at 20 ºC for 2 min. the solvent was allowed to evaporate.

Method (b).- A $10^{-4}$ M solution of [Pt$_2$(dta)$_4$] in CH$_2$Cl$_2$ was cooled down to -50 ºC and then diluted to $10^{-10}$ M in CH$_2$Cl$_2$ and then kept at -50ºC. 20 and 40 μl of the resulting cold $10^{-10}$ M solution were deposited on mica or HOPG, which were previously cooled with liquid Nitrogen just before deposition and placed on a Schlenk flask immersed on a cold bath at -50 ºC. Upon standing these solutions for 2 min. the solvent was dried under vacuum maintaining the Schlenk flask at -50 ºC.

Method (c).- $10^{-4}$ M solution of [Pt$_2$(dta)$_4$] in CH$_2$Cl$_2$ or THF was sonicated (540 wat., 40 kHz) 60 min. at 27 ºC. Then, 20 and 40 μl of a $10^{-10}$ M diluted mother solution were deposited on mica and HOPG, respectively. Upon standing these solutions at 20 ºC for 2 min. the solvent was allowed to evaporate.

Atomic Force Microscopy

Atomic Force Microscopy images were acquired in dynamic mode using a Nanotec Electronica system (www.nanotec.es). Olympus cantilevers were used with a nominal force constant of 0.75 N/m. The images are processes using WSxM (freely downloadable SPM software from www.nanotec.es) operating at room temperature in ambient air conditions.

Figure S1. AFM images resulting of the deposition of a $10^{-10}$ M solution of $[\text{Pt}_2(\text{dta})_4]$ in CH$_2$Cl$_2$ on a Mica surface at room temperature (A), at low temperature (B) or after sonication (C).

Figure S2. Uv-vis spectra of a 3 x $10^{-5}$ M solution of $[\text{Pt}_2(\text{dta})_4]$ at 20 ºC (red line) or -40 ºC (blue line)
**Figure S3.** AFM images resulting of the deposition of a $10^{-10}$ M solution in CH$_2$Cl$_2$ of [Pt$_2$(dta)$_4$] on a HOPG surface at room temperature 24 hours after sonication (A), or after standing a non-sonicated solution during 24 hours (B).

**Figure S4.** AFM images resulting of the deposition of a $10^{-10}$ M solution of [Pt$_2$(dta)$_4$] in THF on a Mica surface at room temperature (A), on a Mica surface at room temperature after sonication (B) on HOPG at room temperature (C) on HOPG at room temperature after sonication (D).