Supporting Online Material for:

SELF-ASSEMBLY OF MESOSCOPIC “AMPHIPHILES”

Sungho Park, Jung-Hyurk Lim, Sung-Wook Chung and Chad A. Mirkin*

Department of Chemistry and Institute for Nanotechnology, Northwestern University, 2145 Sheridan Road, Evanston, IL 60208-3113 USA

*Corresponding Author

Telephone number: (847)-491-2907

Fax number: (847)-467-5123

Email address: camirkin@chem.northwestern.edu
Figure legends

**Figure S1.** Graph of Au and Ppy domain lengths vs charge passed through the alumina membranes. The synthesis of metal-conducting polymer composite rods is based on the alumina template-assisted electrochemical deposition technique, developed by Martin (1). A thin layer of silver (200 nm) was evaporated on one side of the alumina filter (from Whatman International Ltd, \( d = 13 \text{ mm}, \text{pore size} = 100 \text{ nm} \); the pore diameter in the central region of the filter is substantially larger than the quoted 100 nm.) and served as a cathode in an electrochemical cell after making a contact with copper foil in the Teflon cell, using Ag/AgCl as a reference electrode and a platinum wire as a counter electrode, forming a three-electrode configuration. The nano-pores were filled with Ag (Technic ACR silver RTU solution from Technic Inc.) at a constant potential, \(-0.9 \text{ V vs Ag/AgCl}, \) by passing 1.5 C/cm\(^2\). Au was then electroplated from Orotemp 24 RTU solution (from Technic Inc.) at \(-0.9 \text{ V vs Ag/AgCl}. \) Polypyrrole was electrochemically grown inside of the pores by using a homemade monomer solution (0.5 M pyrrole with 0.2 M tetraethylammonium tetrafluoroborate in acetonitrile), at +0.9 V vs Ag/AgCl. Each segment length was controlled by monitoring the charge passed through the membrane. For three segment nanorods (Au-polypyrrole-Au), Au layers were deposited again on top of the Ppy layers using the same condition for depositing the first Au layer. The Ag backing and alumina membranes were dissolved with concentrated nitric acid and 3 M sodium hydroxide solutions, respectively. The rods were repeatedly rinsed with distilled water until the pH of the solution was 7.
Figure S2. (A) Bright- and (B) dark-field optical microscope images of the Au-Ppy bundle aggregates.

Figure S3. To confirm that the apparent difference in block diameters for the polymer and gold portion of the nanorods was real rather than an artifact, we took a contact mode AFM image (Thermomicroscope, CP, Sunnyvale, CA) of a rod on an oxidized Si wafer. The image clearly shows a difference in diameter (approximately 12%, 48 nm) as observed in the SEM images, consistent with the conclusion that the hydrophobic polymer blocks shrink in diameter after the nanorods are released from the template (Supporting online material). (A) A topographic image of a Au-Ppy rod on an oxidized silicon wafer. (B) A line profile between point a and b.

References
Figure S2.
Figure S3.