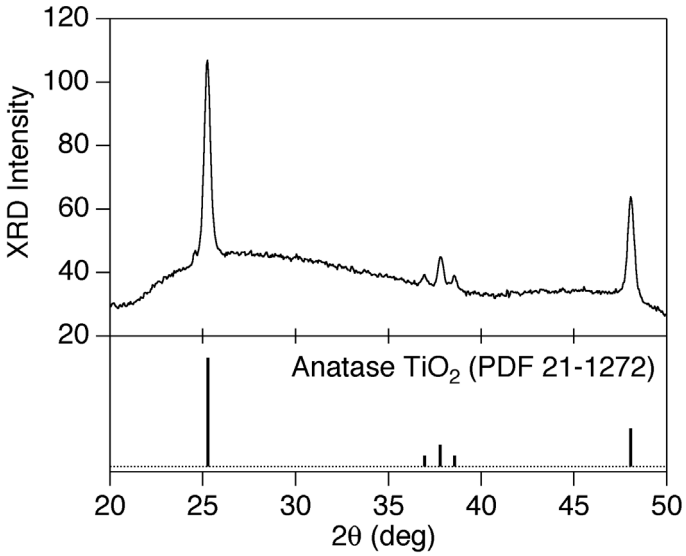
**Supporting Information Available:**

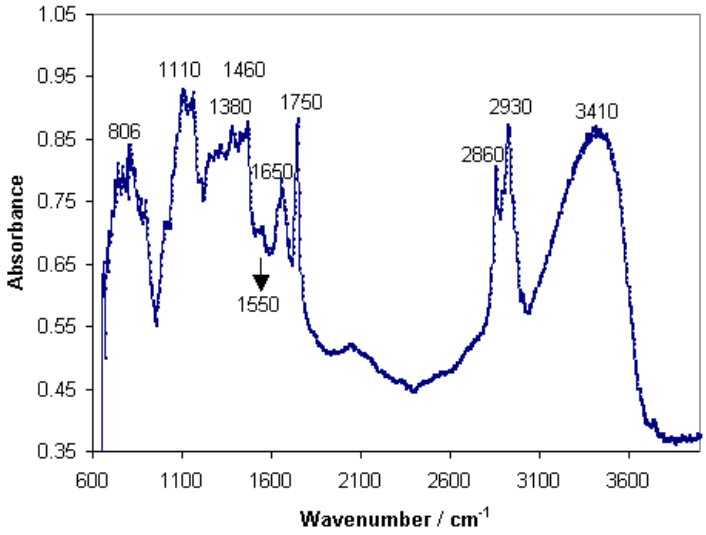
Supplemental 1. XRD experiment of $TiO_2$-dextrin wires:

Before doing X-ray diffraction (XRD) and FTIR experiments, the $TiO_2$/dextrin wires were rescued form solution using tweezers under light microscope and transferred into pure water in 100 mL and gently stirred overnight. This procedure was repeated three times to make sure the wires were free from reagent absorption. The peaks close to 25, 38, and 48 theta displayed by the XRD experiment demonstrated that the anatase $TiO_2$ in the $TiO_2$-detrxin wires conserve their anatase crystal features.



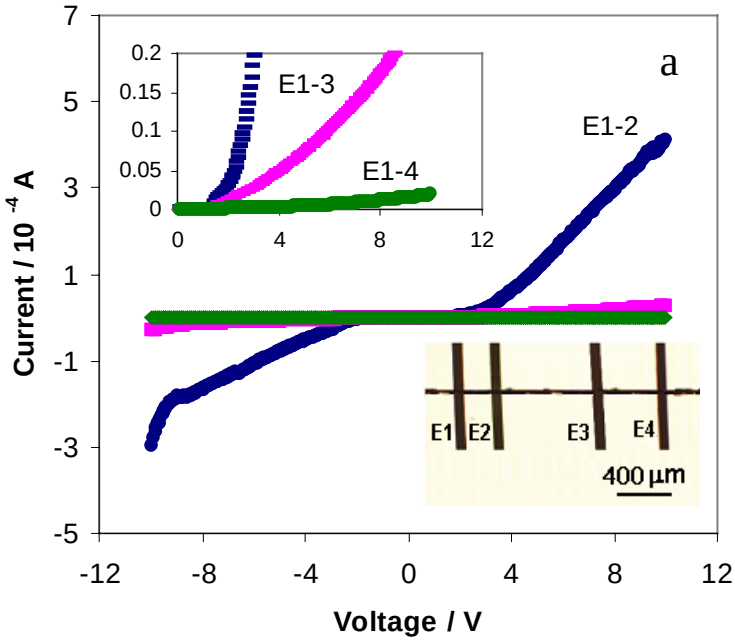

Supplemental 2. FTIR experiments of TiO2-dextrin wires:

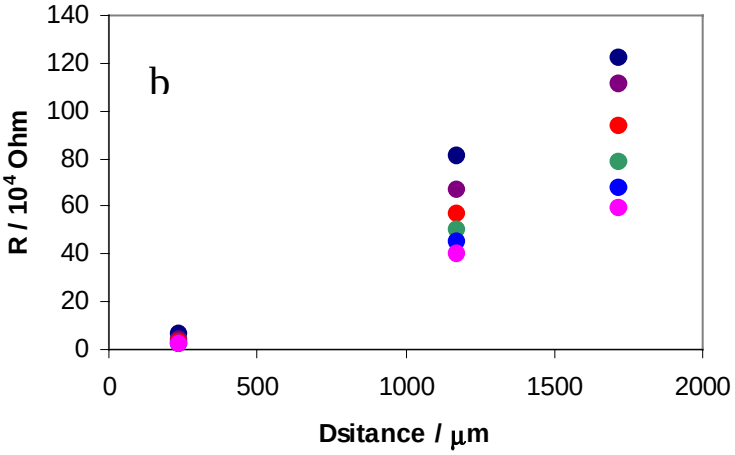
The washing procedure (see supplemental 1) was performed prior to conducting the FTIR experiments. Bands appeared at 2880 $cm^{-1}$ and 2930 $cm^{-1}$ demonstrated that cyclodextrin chemistries, such as $–CH_2–$ and –CH, were associated with the wires. The IR peak appearing at 806 $cm^{-1}$ results from the C-H deformation vibration in carbohydrates. Also, this band reflects the O-C-C-O relative ring vibration. This information is important for understanding the interaction between glucose groups within cyclodextrin and with the titanium in $TiO_2$ crystals. The formation of the O-C-C-O ring with the titanium atom is in good agreement with the theoretical geometry of this interaction. The another strong stretching vibration for C-O appeared at about 1110 $cm^{-1}$ to 1160 $cm^{-1}$ which conforms the association of the cyclodextrin with $TiO_2$, as do the peaks that appeared at 1380 $cm^{-1}$ and 1460 $cm^{-1}$, which are attributed to the C-H deformation and scissor vibration and the $CH_2$ deformation vibration, respectively.

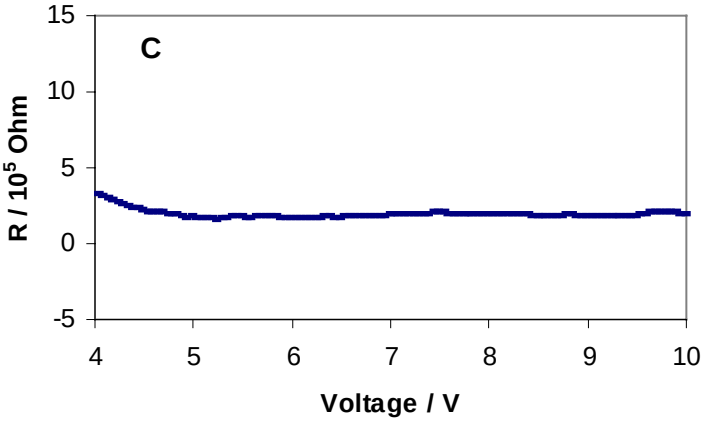


Supplemental 3. Electrical measurements of $TiO_2$-dextrin wires.

Electrical measurements of the $TiO_2$-dextrin wires were based on a four gold electrode bridge. (a) Shown are the distances from the first electrode (E1) to the next three electrodes, which are: 236, 1170, and 1714 μm are shown (bottom inset). (b) Shows the linear relationship of the resistance with distance (from the top to the bottom), the potentials are 4, 5, 6, 7, 8 and 9 V. (c) Shows the resistances of the $TiO_2$ wire at the length $[(L_{E3\text{-}E2}) - (L_{E4\text{-}E3})]$ with removal of the contact resistance over the voltage range 4 to 10 V. We can see the two phases in the I-V curves: one is from –2.5 to 2.5 V and the other is over the range 4 to 10 V. For this second phase, we see the influence of the contact resistance between the gold electrode and the $TiO_2$ wire. Between electrode 1 and electrode 2, the resistance of the wire at this distance competes with the resistance of the contact, because the current increases very rapidly. Between electrode 1 and electrode 3, the resistance of the wire is much greater than that of the contact, and so is the resistance of the wire between electrode 1 and electrode 4. From the voltage 4 to 10V, for example, the wire resistance has a good linear relationship with the length of the wire. By removing the contact resistance, the wire resistances at the lengths $(L_{(E3\text{-}E2)} - L_{(E4\text{-}E3)}) = 390$ μm is constant with the voltage. Therefore, the average of the resistance of this wire is $5.077 \times 10^2$-Ohm $\mu m^{-1}$.

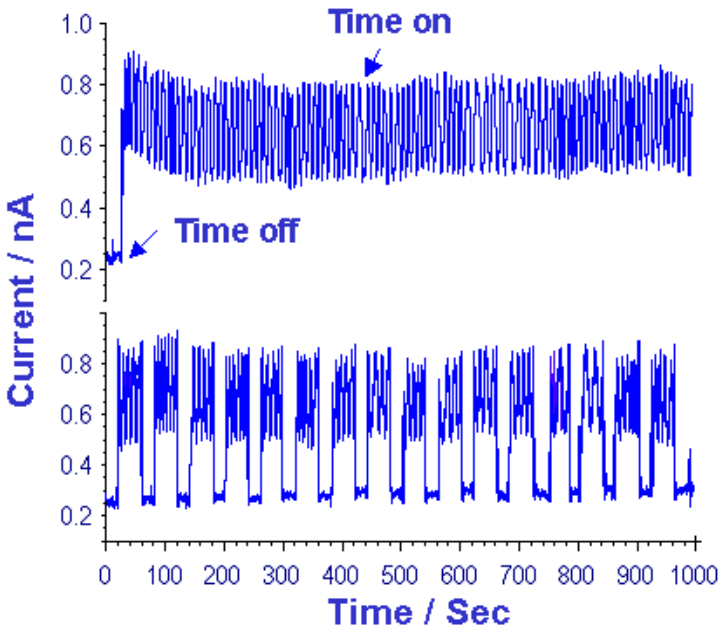


Supplemental 4. Photocurrent measurement of $TiO_2$-dextrin wires.

Using the excitation wavelength 366 nm from a UV lamp (254/366 nm, Model UVSL-58) and an Electrochemical Analyzer with I-t function (CHI 650), we measured the photocurrent of single $TiO_2$-dextrin wires. Conductive silver gel was used to make conductive pads connecting a single $TiO_2$ wire to the wires conducting signals out to the Electrochemical Analyzer. (a) The photocurrent of a wire at a potential of 10 mV is about 410 pA and appears to decay only slightly within 1000 seconds. (b) The photo current during light on/off cycles responds quickly.




Supplemental 5. Height profiles of the $TiO_2$-dextrin wires and wire bundles demonstrated by AFM.

Atomic force microscopy (AFM) profiles show that the diameters of $TiO_2$-dextrin wire bundles were about 1 to 2 µm. The example shown in image (a) is about 1.5 µm. The single strands of wires were about 250 to 800 nm in height. The example of two single wires in image (b) shows that they are about 290 nm in height. From image (b), we can see that the $TiO_2$ particles form remarkably liner arrays. Formation of the larger bundles does not appear to be related to the smaller wires (a simple conjugation of mature wires).