Supporting Information

UV Induced Formation of Transparent Au-Ag Nanowire Mesh Film for Repairable OLED Devices

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Estimation of UV penetration depth

In order to estimate the penetration depth the light beyond the substrate surface into the growth solution, transmittance of the following solutions was measured: a CTAB solution of the same concentration as in the synthesis (black line signed "CTAB"); a solution containing CTAB, gold, silver and sodium ascorbate at the same concentrations as in the standard (red line signed "With SA"); and a solution which contains standard CTAB concentration and the rest reagents (gold, silver and sodium ascorbate) diluted by 100 (green line signed "factor 100"). The optical path length was 1mm.

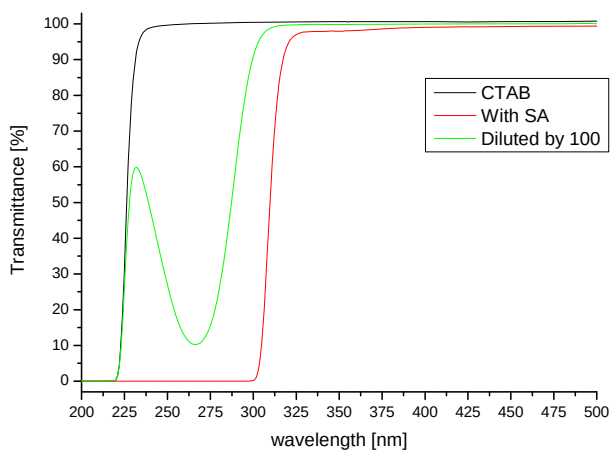


Figure S1. – Transmittance spectrum of CTAB, synthesis and diluted synthesis solutions.

At 254 nm (the peak emission of the mercury lamp) the diluted solution has 19.8%. transmittance.

$$A(254nm) = \varepsilon bc = -log 0.198 = 0.703 \rightarrow \varepsilon = \frac{0.703}{bc} = const$$

Taking into account the value for **ε**, and the concentration of the synthesis solution, we can calculate the depth at which the transmission is at 10%, under this value of transmission we assume that the reduction process is not efficient. Thus, the depth at which the transmission is 10% is given by:

$$A(254nm) = \frac{0.703}{bc} b^* 100c = \frac{b^*}{b} 70.3 = 1 \rightarrow b^* = \frac{b}{70.3} = 14 \cdot 10^{-6} = 14 \mu m$$

Thus, according to these calculations, the UV light can only reduce metal ions within about 10 μm from the surface of the substrate.

UV System Setup

The substrate is placed over the synthesis solution which covers its bottom surface. The UV light from a 100-watt mercury arc lamp goes through the substrate and the reaction occurs at the interface between the bottom of the substrate and the solution. The illumination intensity at the substrate is about 10 W/cm^2.

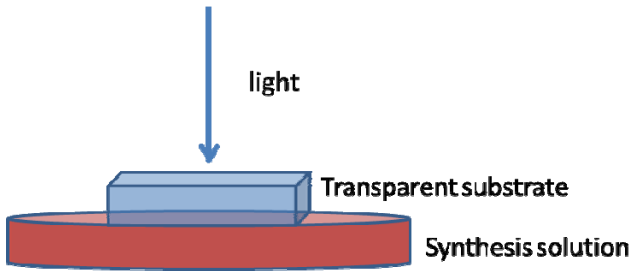


Figure S2. – Schematic representation of UV system

Nanowire stabilization by additional gold deposition

Additional gold deposited by dipping in an aqueous solution containing CTAB-$HAuCl_4$-ascorbate for 10 minutes.

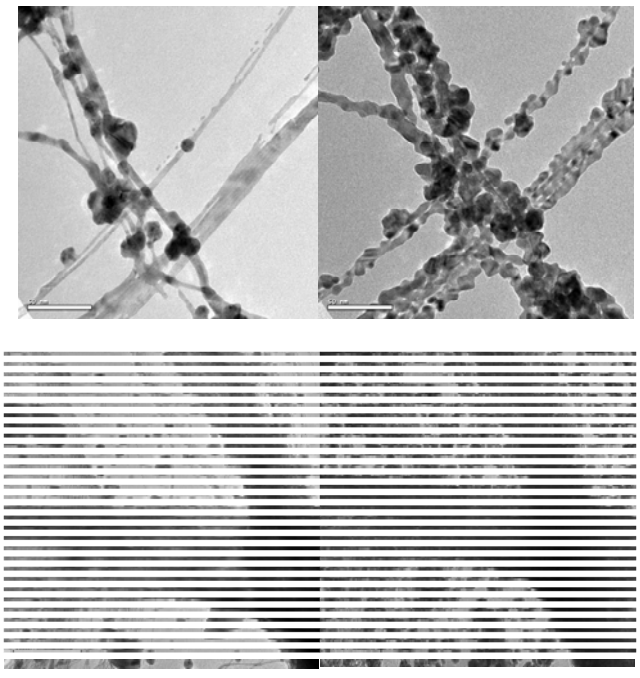


Figure S3. TEM images of the nanowire films deposited on a carbon coated TEM grid before (left) and after (right) 10 min dipping in the nanowire stabilization bath.

Interruption of OLED electroluminescence

In order to prove that the origin of light in the electroluminescence experiment is from the working OLED device, we shut off the device during the experiment.

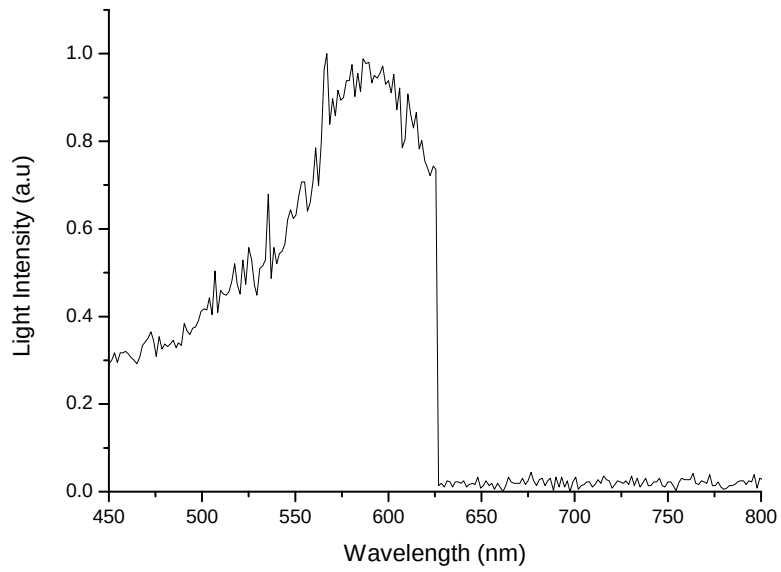
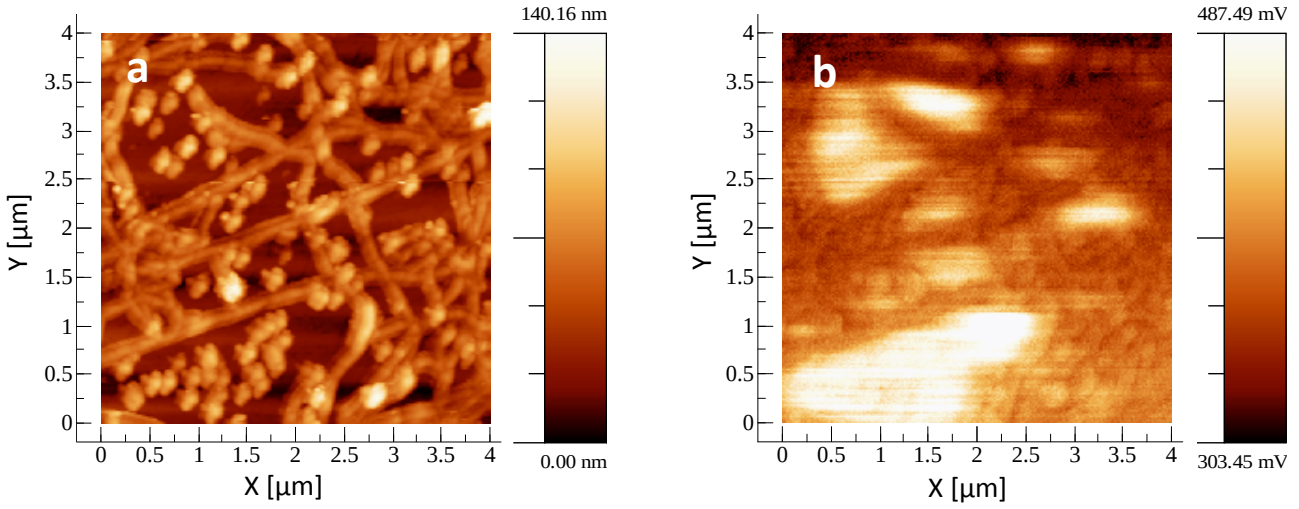


Figure S4. – Electroluminescence spectrum of working OLED device, with turnoff at 625 nm.

Kelvin probe force microscope measurement



Sample	CPD
HOPG	0.15 V
Au-wires	0.26 V

Sample	WF
HOPG	4.6 eV
Tip	4.75 eV
Au-Wires	4.49 eV

$$CPD \equiv -\left(\frac{\varphi_t - \varphi_s}{q}\right)$$