Electronic Supplementary Material (ESI) for Nanoscale.

Supporting Information

Three-Dimensional Superhydrophobic Copper 7,7,8,8-Tetracyanoquinodimethane Biointerfaces with Capability of High Adhesion of Osteoblast

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Experimental section

TCNQ was purchased from Aldrich. The characterization of the products were performed by scanning electron microscopy (SEM, JSM-7500F, Japan), Ultraviolet–visible spectroscopy (UV-vis, UV-2600, Japan), Fourier-transform infrared spectroscopy (FTIR, TENSOR-27, Germany), energy-dispersive X-ray diffraction (EDX, HIT S4300 SFEG 132-10, America), X-ray photoelectron spectroscopy (XPS, Ultra Axis DLD, Japan), X-ray diffraction (XRD, Empyrean, Netherlands), transmission electron microscopy (TEM, JEM-2100, Japan). The contact angle of the surfaces was detected by OCA20 machine (Data-Physics, Germany).

For the preparation of CuTCNQ nanowire arrays, copper film was firstly deposited on indium tin oxide (ITO) glass substrates *via* vacuum evaporation. The substrates were cleaned with pure water and isopropanol three times. After copper deposition, TCNQ powder was placed in a quartz boat. Then, ITO glass substrates covering with Cu were reversedly placed in TCNQ powder and finally heated at 150 ^{o}C under vacuum. When the system was cooled to room temperature, CuTCNQ nanowire arrays were obtained on the substrates.

In the cell adhesion experiment, CuTCNQ nanowires arrays were placed in six-well cell culture plate. 5 ml of culture medium [α-MEM(N)] containing 10^5/ml MC3T3-E1 was added into the well of cell culture plate. The MC3T3-E1 was stained by calcein in advance. Then the culture plate was placed in an incubator (5% CO_2, 37 ^{o}C) for 30 min. After rinsed, the cells adhering onto the CuTCNQ nanowires arrays were imaged and counted by using a fluorescence microscope (Nikon, TE2000, Japan). The observation of cells on the CuTCNQ nanowire arrays were fixed using glutaraldehyde solution, dehydrated in gradient ethanol and finally dried in critical carbon dioxide for SEM observation.

To detect the cell viability of MC3T3-E1 on superhydrophobic CuTCNQ surfaces, the substrates were stained by acridine orange/propidium iodide (AO/PI) after 30 min cell culture. The immobilized cells were imaged and counted by using a fluorescence microscope. The red cells in the view are dead while the green ones are alive.

Viability (%) = (The number of living cells on substrate / The number of total cells) × 100

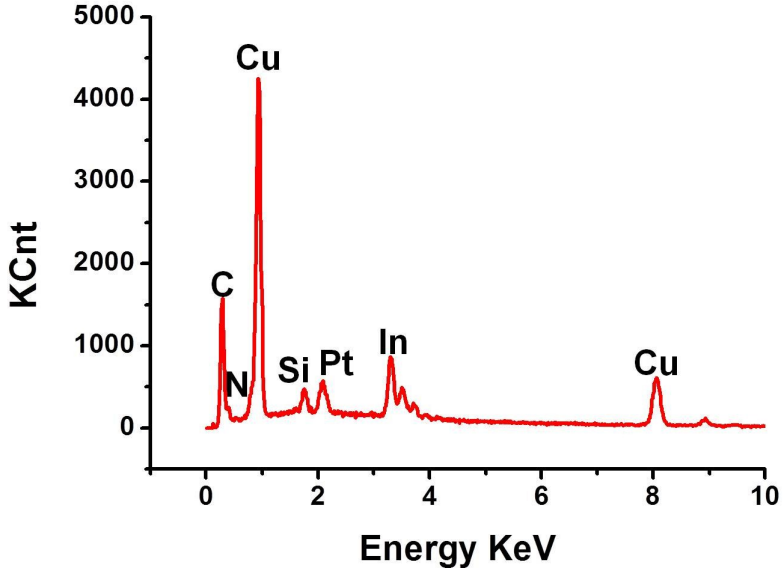

Fig. S1 The EDX demonstrated the exsitence of C, N and Cu elements on the nanowires.

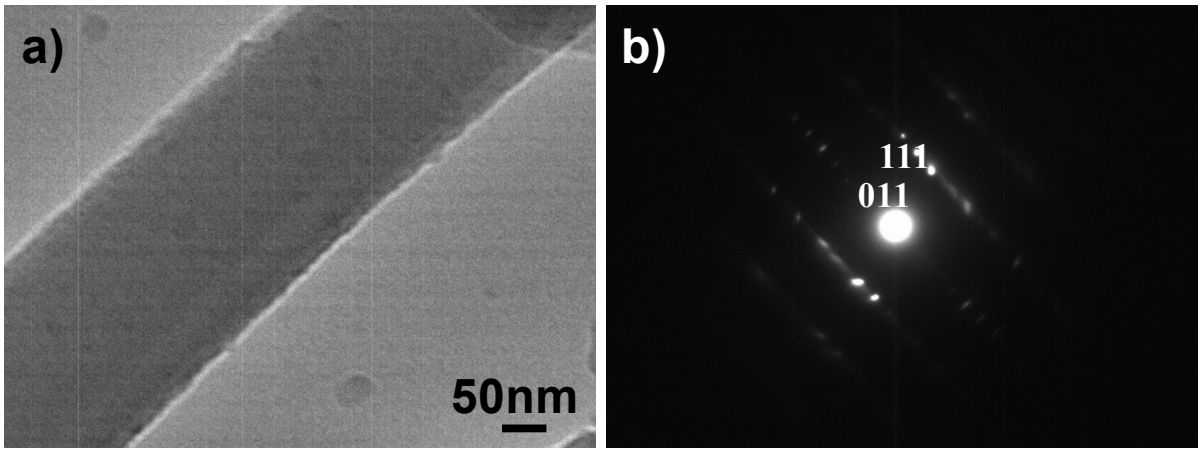

Fig. S2 (a) A TEM micrograph of single nanowire. (b) The selected-area electron diffraction (SAED) pattern of the nanowire.

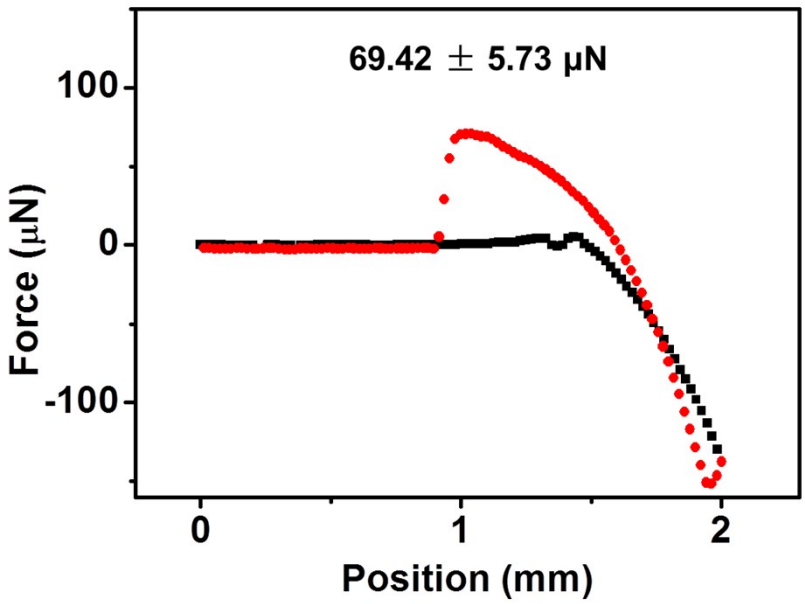

Fig. S3 The adhesion force of water droplet on the superhydrophobic CuTCNQ nanowire surface.

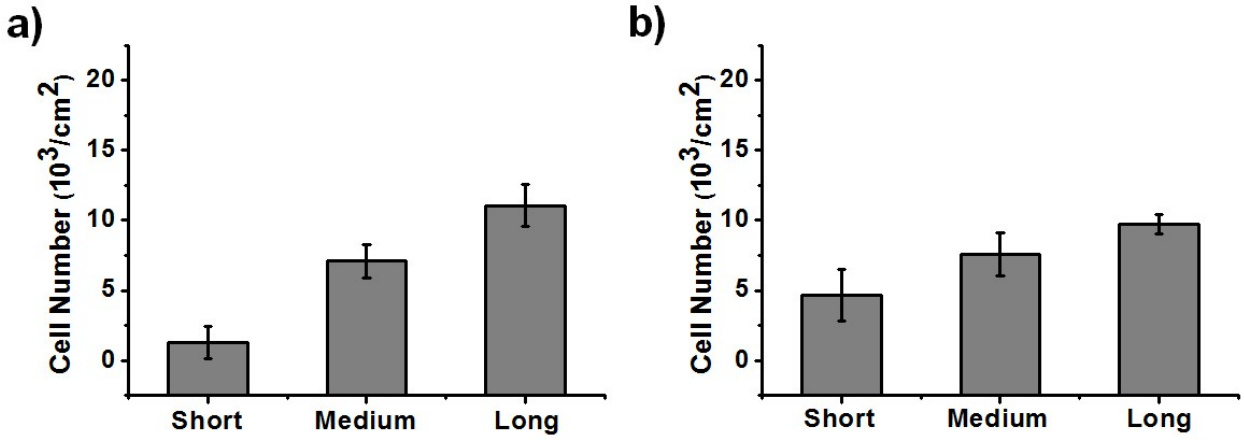

Fig. S4 The influence of the length of nanowires on cell number. (a) 3T3; (b) T24.

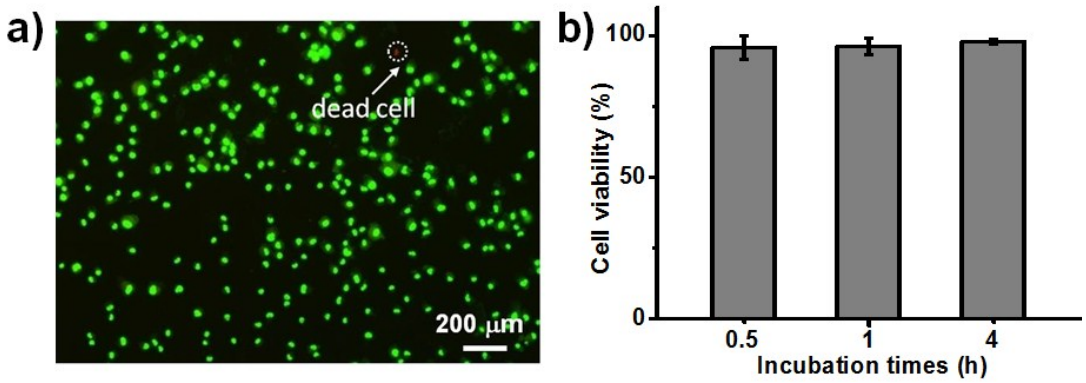

Fig. S5 (a) Fluorescence microscope image of MC3T3-E1 cells on the superhydrophobic CuTCNQ nanowire arrays. (b) The viability of MC3T3-E1 on the superhydrophobic CuTCNQ nanowire arrays with different incubation times.