Supporting Information

A highly sensitive, wide range pressure sensor based on carbon nanocoil network fabricated by electrophoretic method

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1. The cross-sectional SEM image of the sensor after encapsulation.

Figure S1 shows the cross-sectional SEM image of the sensor after encapsulation. Figure S1a is the original image of the cross-sectional SEM. It is observed that a single CNC is protruded from the upper PDMS and some trails on the upper PDMS represent some CNCs are cut off. Figure S1b is the modified image which illustrates some CNC models to represent the cut-off CNCs. It is obvious that the CNCs are all inside the upper PDMS because the upper PDMS was semi-dried and the lower PDMS was dry in the encapsulation process, so the CNCs were completely embedded in the upper PDMS. The thickness of the CNC network is very thin and the CNCs are basically in a single layer and uniformly distributed.

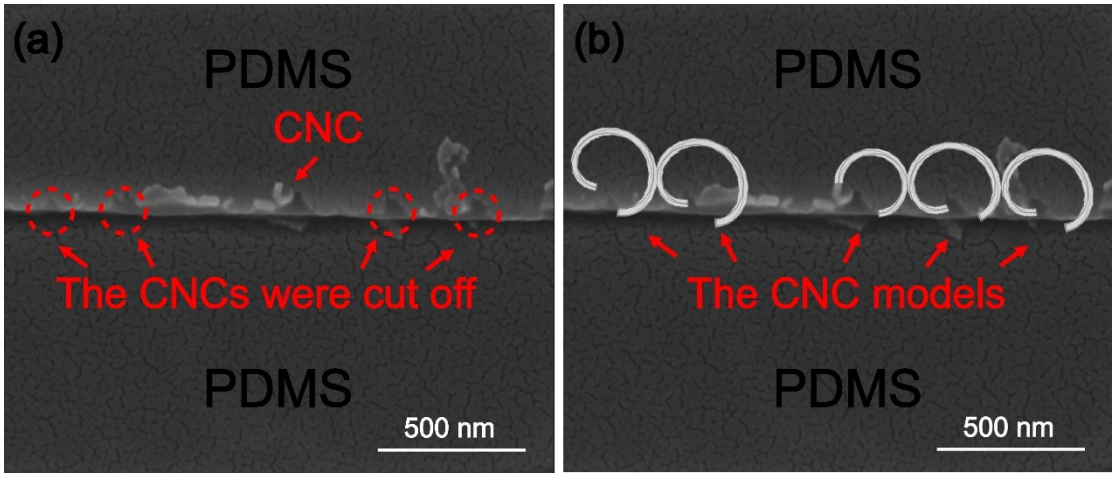

Figure S1. The cross-sectional SEM image of the sensor after encapsulation. (a) The original image. (b) The modified image.

2. The schematic illustration of the contact points in the sensor.

As shown in Figure S2, the length of the electrodes is 1.5 cm, and the distance between the electrodes is 100 μm. The conductive pathways can be regarded as a M×N network, where M, N are the number of contact points between adjacent CNCs in a line and between CNCs and electrodes, respectively. Because the length of the electrodes is much longer than the distance between the electrodes, so the relationship between M and N can be expressed as, $M = N - \alpha'$, where α' is a constant.

It is observed that CNCs and electrodes form a shunt circuit, and the resistance of the shunt circuit is inversely proportional to the number of the contact points between CNCs and electrodes. Therefore, the relationship between N and R/R_0 can be expressed as $N = \frac{\omega}{(R/R_0)}$, where ω is a constant.

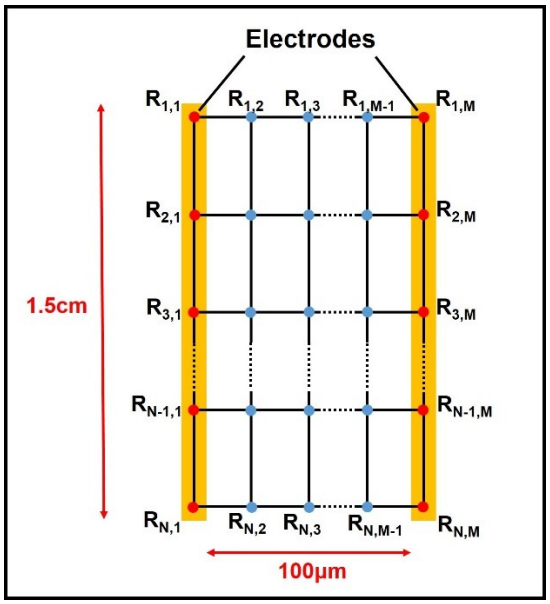

Figure S2. The schematic illustration of the contact points in the sensor.