Electronic Supplementary Material (ESI) for RSC Advances.

Selenium doped Ni-Ti layered double hydroxide (Ni-Ti LDH) films with selective inhibition effect to cancer cells and bacteria

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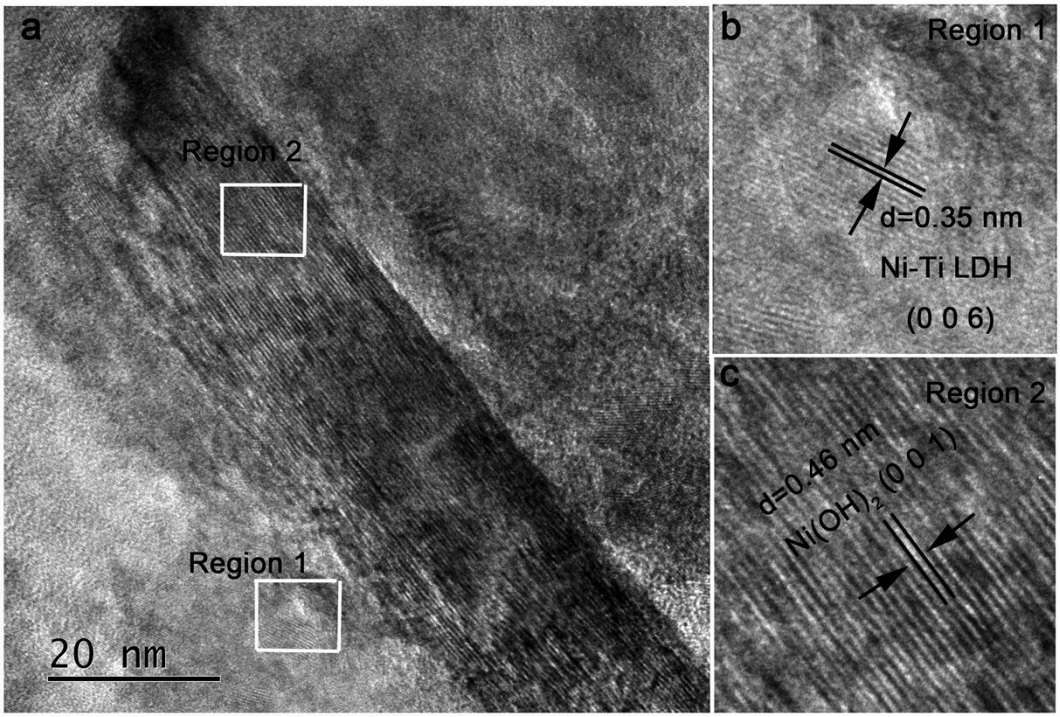

Fig. S1 The HRTEM image of Se0# (a) which show the existence of Ni-Ti LDH (a) and $Ni(OH)_2$ (c).

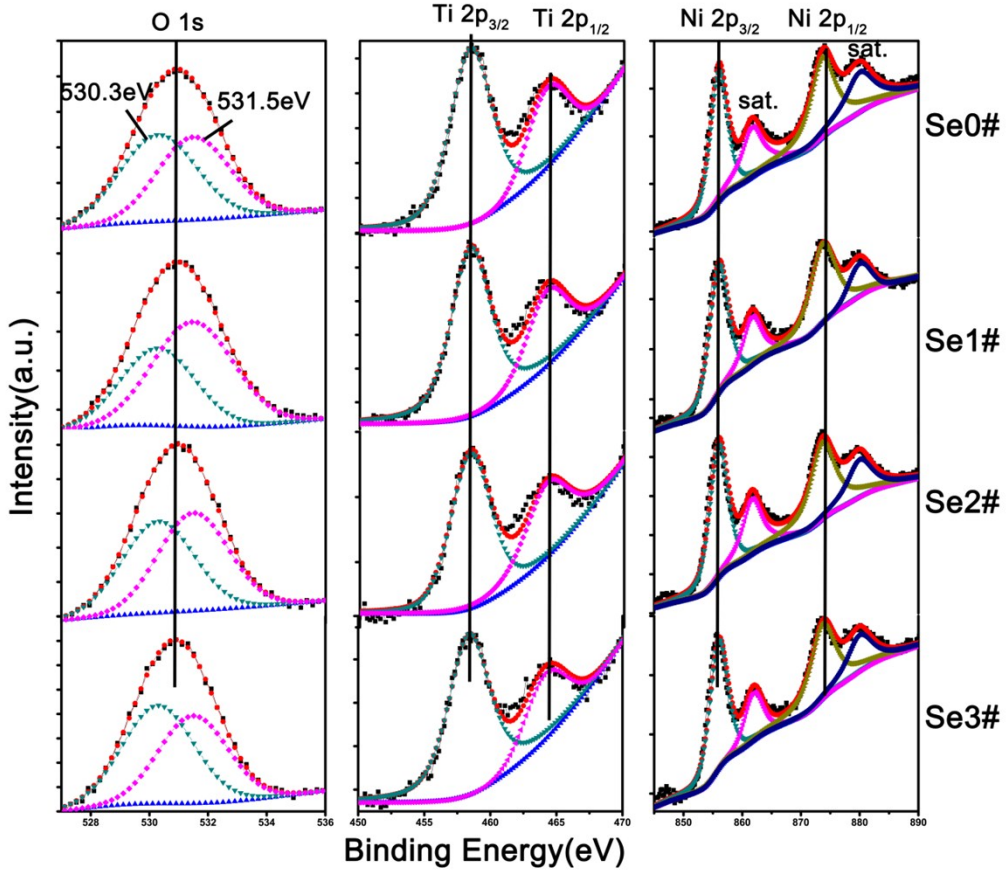

Fig.S2 XPS spectra of O 1s, Ti 2p and Ni 2p in sample Se0#, Se1#, Se2# and Se3# respectively.

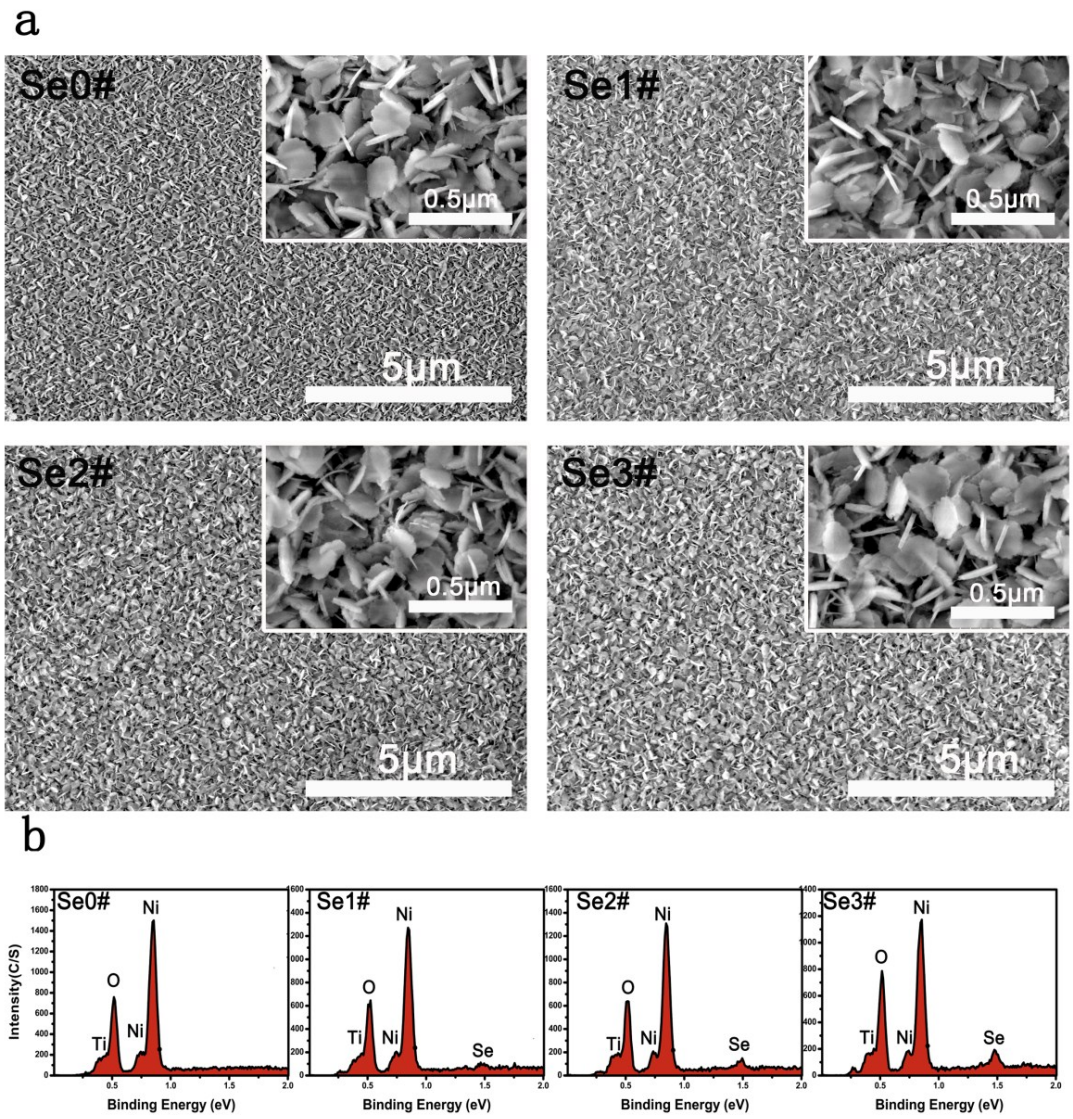

Fig.S3 SEM images of different samples at low and high magnification (a), and the corresponding EDS patterns (b).

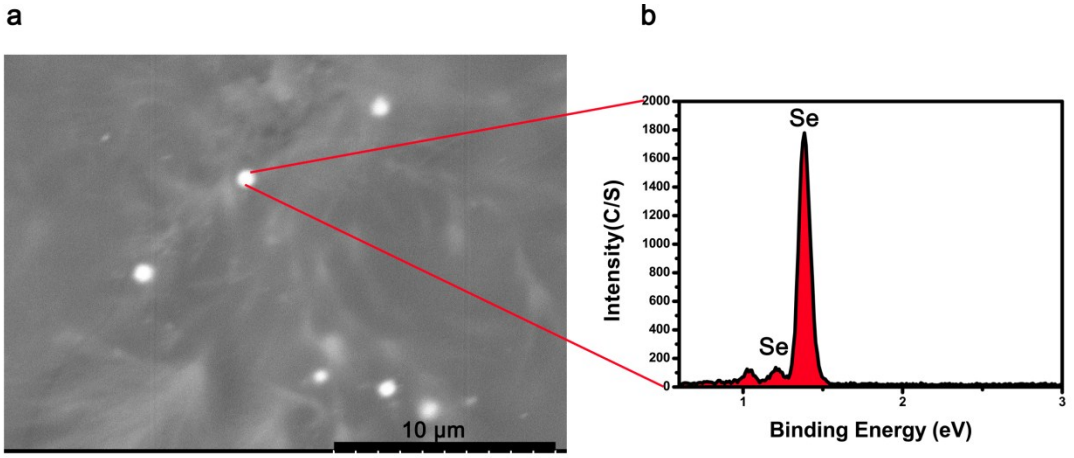

Fig. S4 SEM images of the prepared nano selenium (a), and the corresponding EDS pattern (b).

Fig. S5 Photo shows the Tyndall effect of the prepared selenium sol.

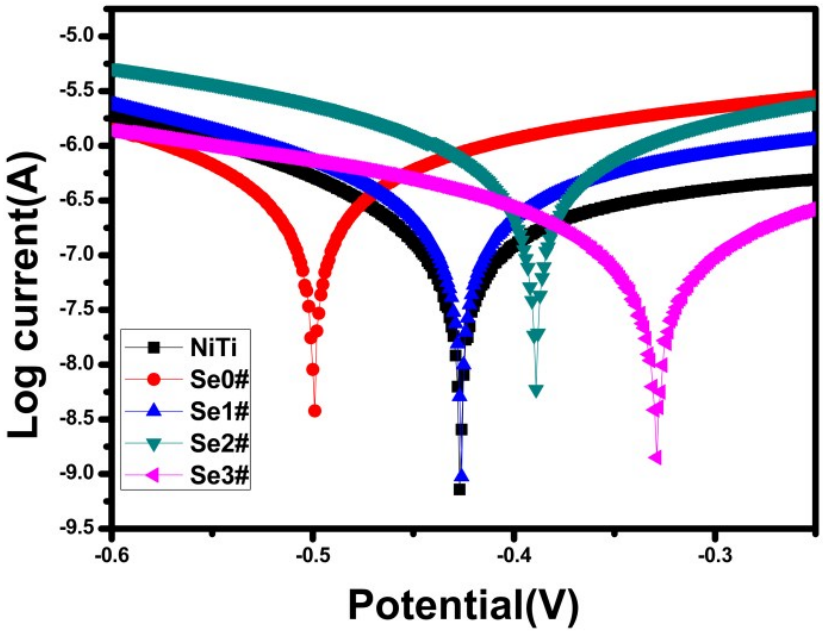

Fig. S6 Polarization curves of different samples

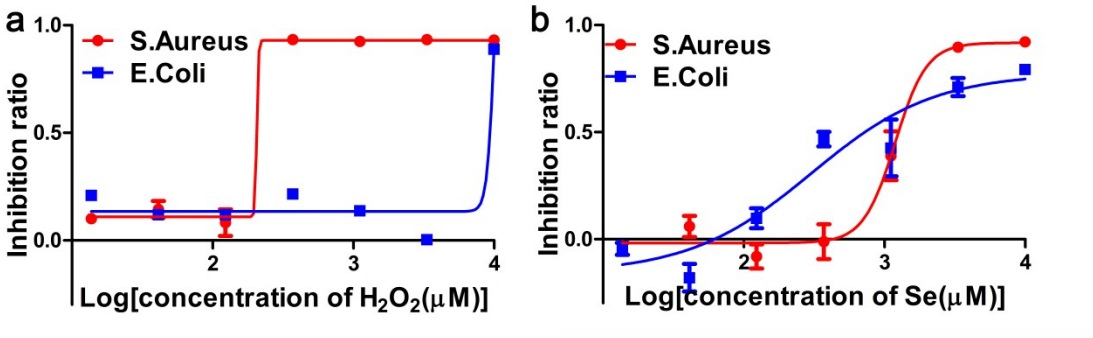

Fig. S7 IC50 curves of H_2O_2 (a) and selenium (b) to S. aureus and E. coli respectively.

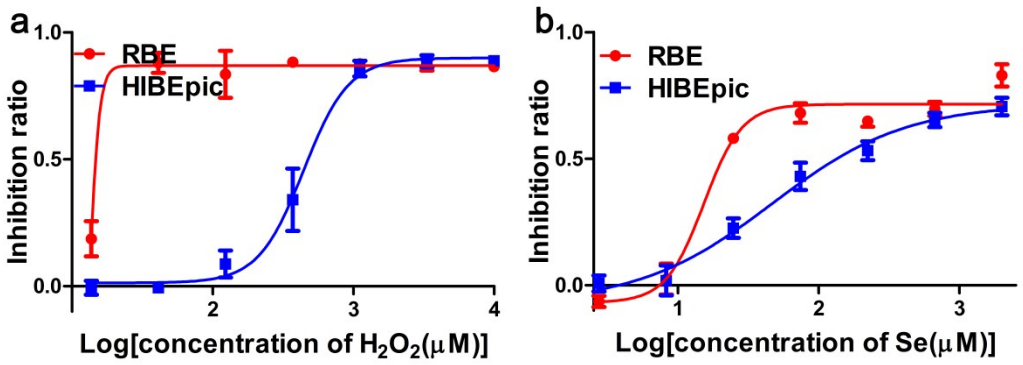

Fig. S8 IC50 curves of H_2O_2 (a) and selenium (b) to cancer cell RBE and normal cell HIBEpic respectively.

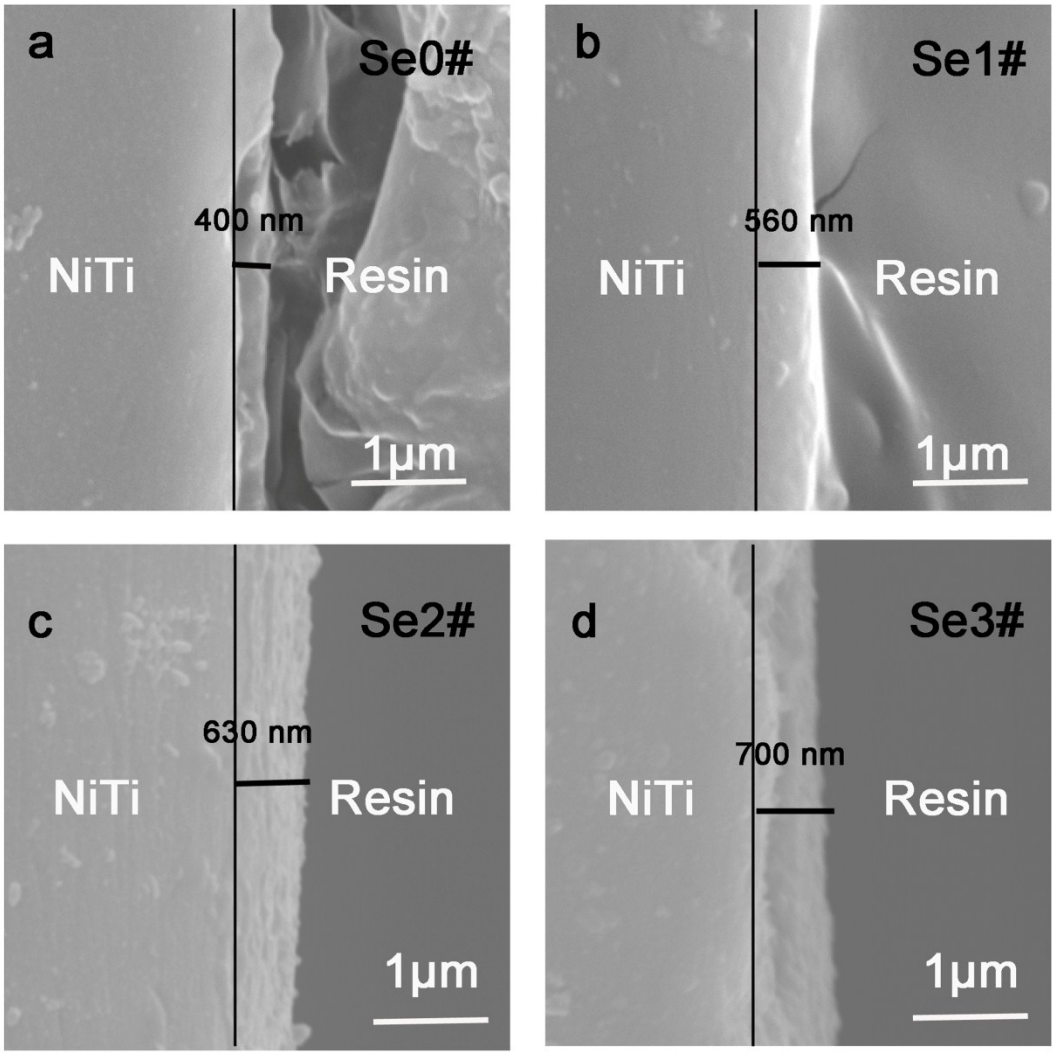

Fig. S9 SEM images show the cross section of different samples, a: Se0#, b: Se1#, c: Se2#, d: Se3#.

The selection for the method to characterize the elemental composition of the prepared films

As shown in Fig. S9, all of the films prepared in this study are less than 1 μm. It seems more accurate to characterize the elementary composition of the films by XPS. However, the inevitable carbon and oxygen contamination in the test of XPS will bring a large variation in the final results. Table S1 presents the elementary composition of different samples acquired by the XPS analysis. Big differences of elemental contents can be found among different samples. Because of the carbon and oxygen contamination, the absolute values of the elemental contents are meaningless and incomparable. We can only compare the contents by the ratio of different element. It can be found that the Ni/Ti ratios stay around 5 and keep stable for different samples, which means we can take the titanium content as a reference. Therefore based on the Se/Ti ratio, we can learn that the selenium content of Se3# is the highest while Se1# is the lowest. This information can be got directly by the EDS tests. So we choose to use the cheaper and more stable test methods, EDS, to qualify the elemental composition in this work.

Table S1 elemental composition (at. %) of different samples acquired by XPS tests

	C	O	Ti	Ni	Se	Ni/Ti	Se/Ti
Se0#	18.99	46.45	5.50	29.06	0	5.28	0
Se1#	32.46	45.77	3.40	17.80	0.57	5.24	0.17
Se2#	25.66	47.20	4.25	21.49	1.40	5.01	0.33
Se3#	41.55	44.59	2.18	10.35	1.38	4.74	0.63

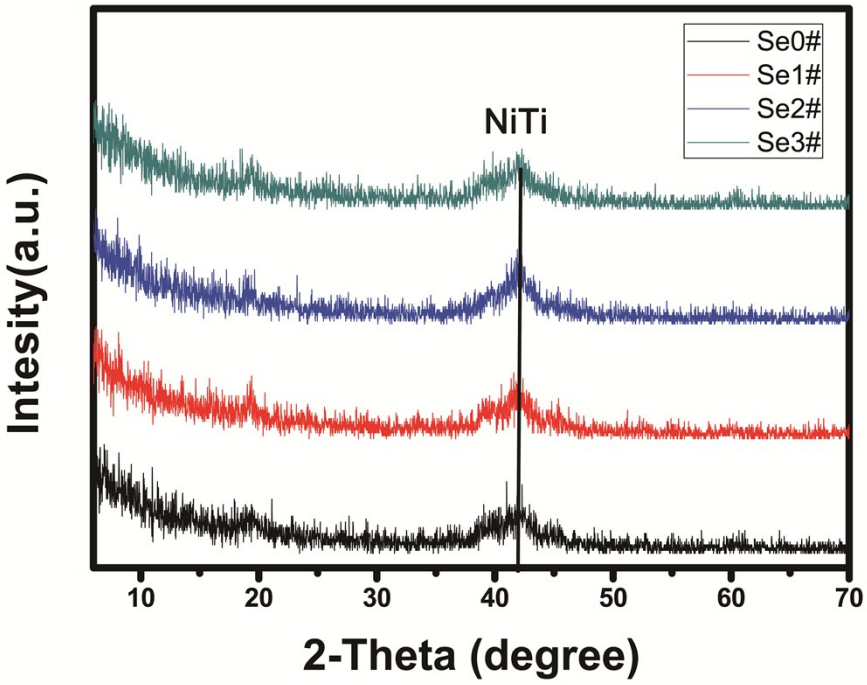

Fig. S10 XRD patterns got directly from different samples.

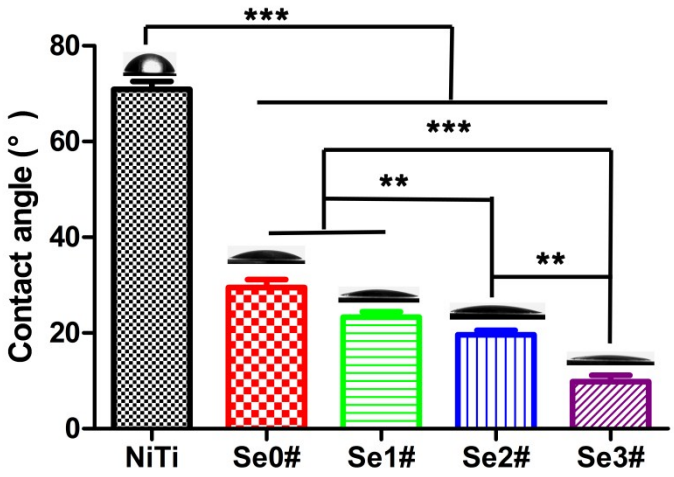

Fig. S11. The contact angle of different samples

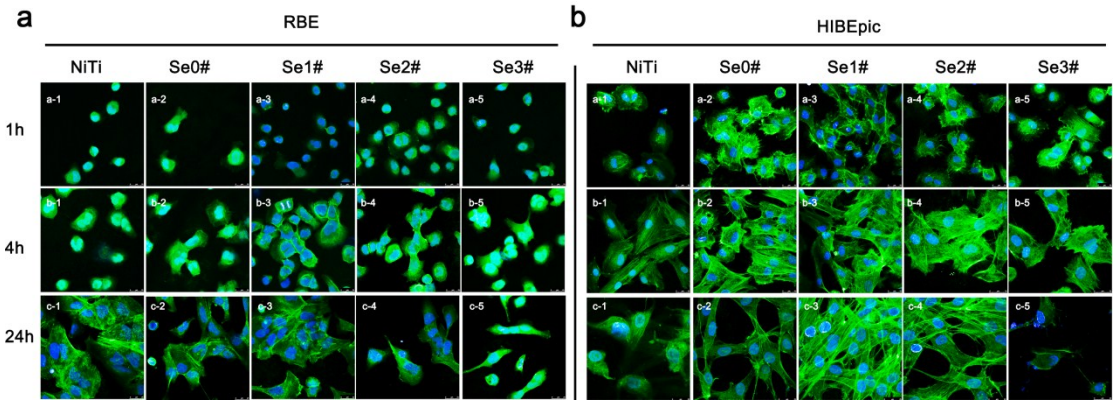

Fig. S12. CLSM images of RBE cells (a) and HIBEpic cells (b) cultured for 1h, 4h and 24h on various surfaces with F-actin stained with FITC (green) and the nucleus stained with DAPI (blue).

The effect of selenium doping to cell spreading.

The cell spreading ability on different samples was investigated by staining the cell skeleton at different time point. The results are presented in Fig. S7. After 1 h culturing, both cancer cells and normal cells spread better on samples containing higher amount of selenium. This phenomenon may be induced by the rising hydrophilia of samples containing higher amount of selenium (Fig. S6). However cancer cells on sample Se3# do not spread well, which may be inhibited by the high amounts of selenium released from the Se3#. While, normal cells cultured on Se3# are not affected by the selenium, which indicates cancer cells are more sensitive to selenium than normal cells. This result is in accordance with the IC50 curves (Fig 5b). After 4 h culturing, cells cultured on selenium doped samples still spread better than cells cultured on NiTi and Se0#. But the number of cancer cells cultured on sample Se2# and Se3#, and normal cells cultured on Se3# decreased, which means the high selenium amounts doped samples begin show inhibition effect to cells. After 24 h culturing, the inhibition effect become more obvious. These results are in well accordance with the proliferation profile of cancer cell and normal cell

(Fig . 10a, b).