

## Supplement material

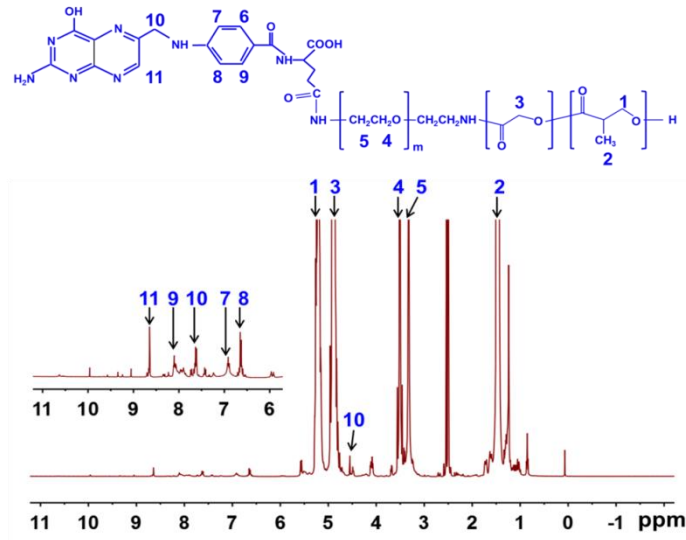


Figure S1. <sup>1</sup>H NMR spectrum of PLGA-PEG-FA polymer.

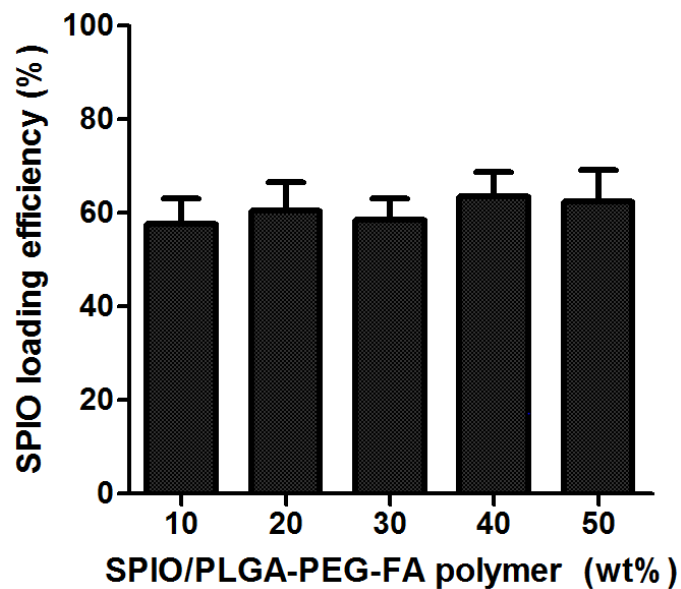
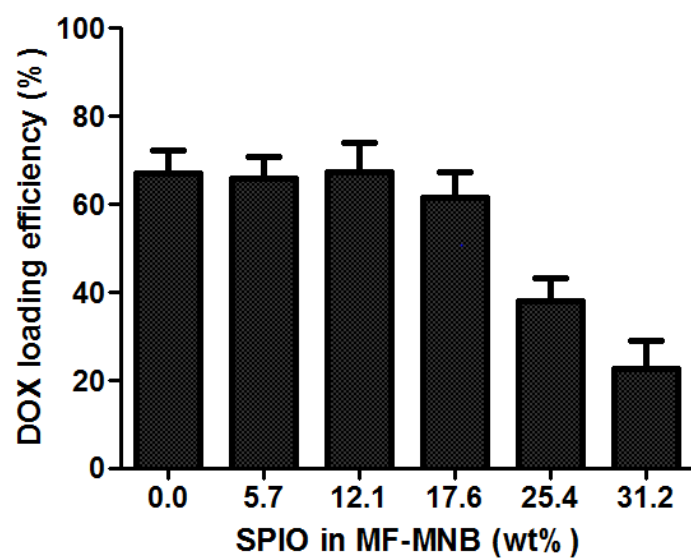
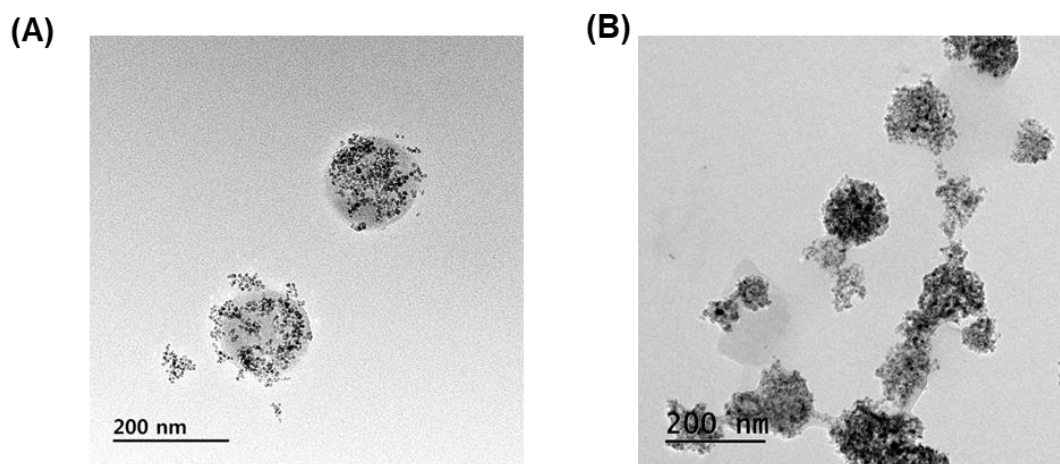


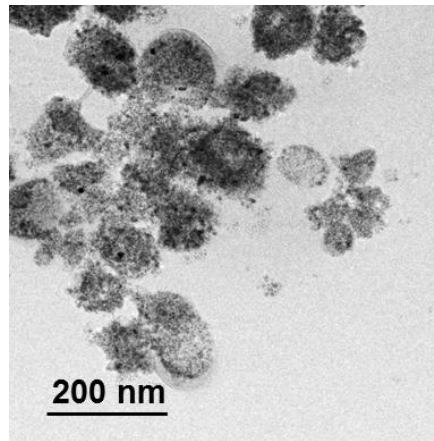
Figure S2. SPIO encapsulation efficiency with different weight percent of SPIO to PLGA-PEG-FA polymer.



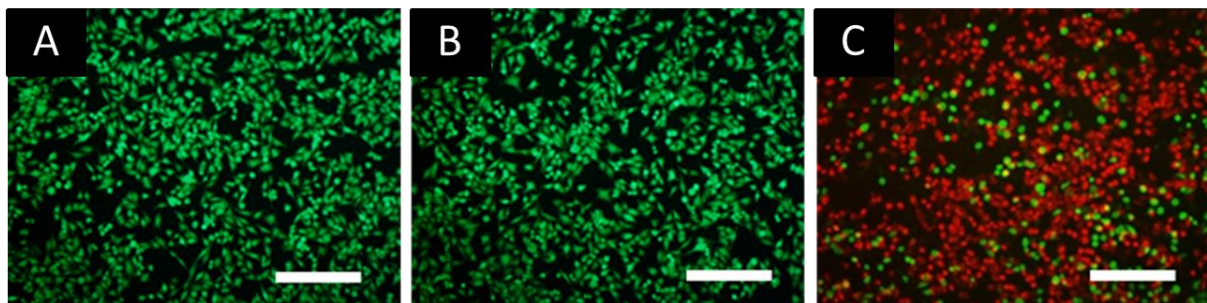
**Figure S3.** DOX loading efficiency in MF-MNB with different weight percent of SPIO in MF-MNB.



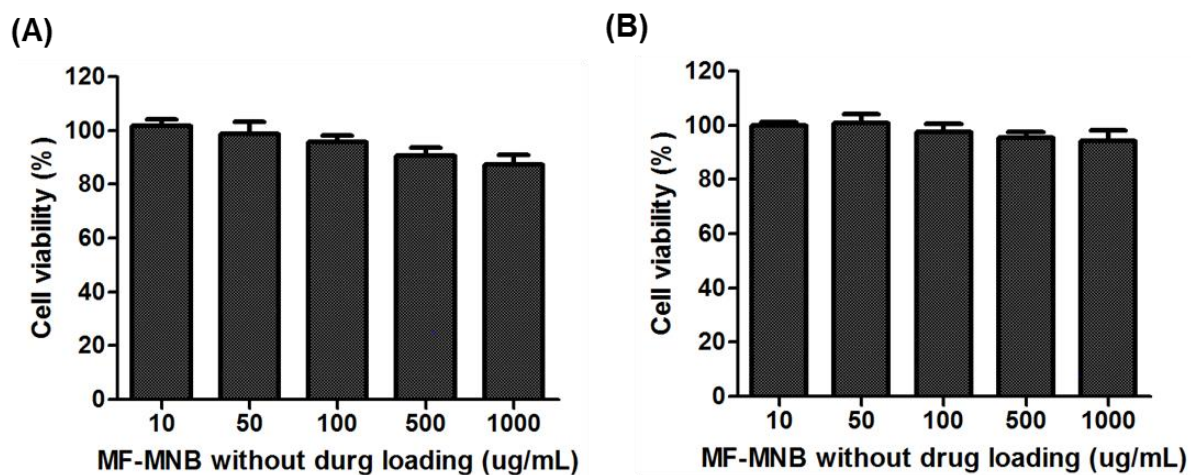
**Figure S4.** TEM images of MF-MNB with (A) 5.7wt% of SPIO and (B) 25.4wt% of SPIO.



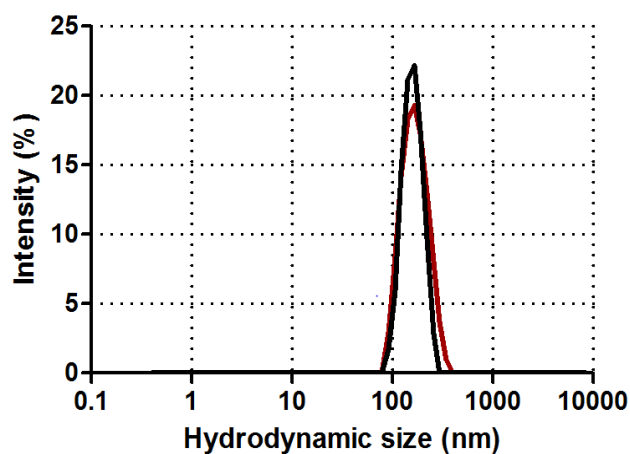
**Figure S5. TEM image of MF-MNB after treated with FUS for 3min.**



**Figure S6 Fluorescence microscopy images of (A) live and dead 4T1 cells treated with FUS sonication for 3min, (B) pure MF-MNB and (C) free DOX (green fluorescence is associated with Calcein AM and the red fluorescence shows PI). All scale bars are 200  $\mu\text{m}$ .**



**Figure S7. Biocompatibility test of MF-MNB.** (A) and (B) Viability of NIH3T3 and 4T1 cells incubated for 24 h with DOX unloaded MF-MNB.



**Figure S8. Stability test of MF-MNB in PBS buffer (pH 7.4),** black line is the size distribution of MF-MNB in PBS at the time of 0h, red line is the size distribution of MF-MNB at the time of 24h.