Supporting Information

A New and Facile Method to Prepare Uniform Hollow MnO/Functionalized-mSiO_2 Core/Shell Nanocomposites

Yung-Kang Peng,[1] Chih-Wei Lai,[1] Chien-Liang Liu,[1] Hsieh-Chih Chen,[1] Yi-Hsuan Hsiao,[1] Wei-Liang Liu,[2] Kuo-Chun Tang,[1] Yun Chi,[2] Jong-Kai Hsiao,[3,4] Kun-Eng Lim,[3,4] Hung-En Liao,[3] Jing-Jong Shyue[5] and Pi-Tai Chou[1*]*

[1]Department of Chemistry, National Taiwan University, Taipei 106, Taiwan

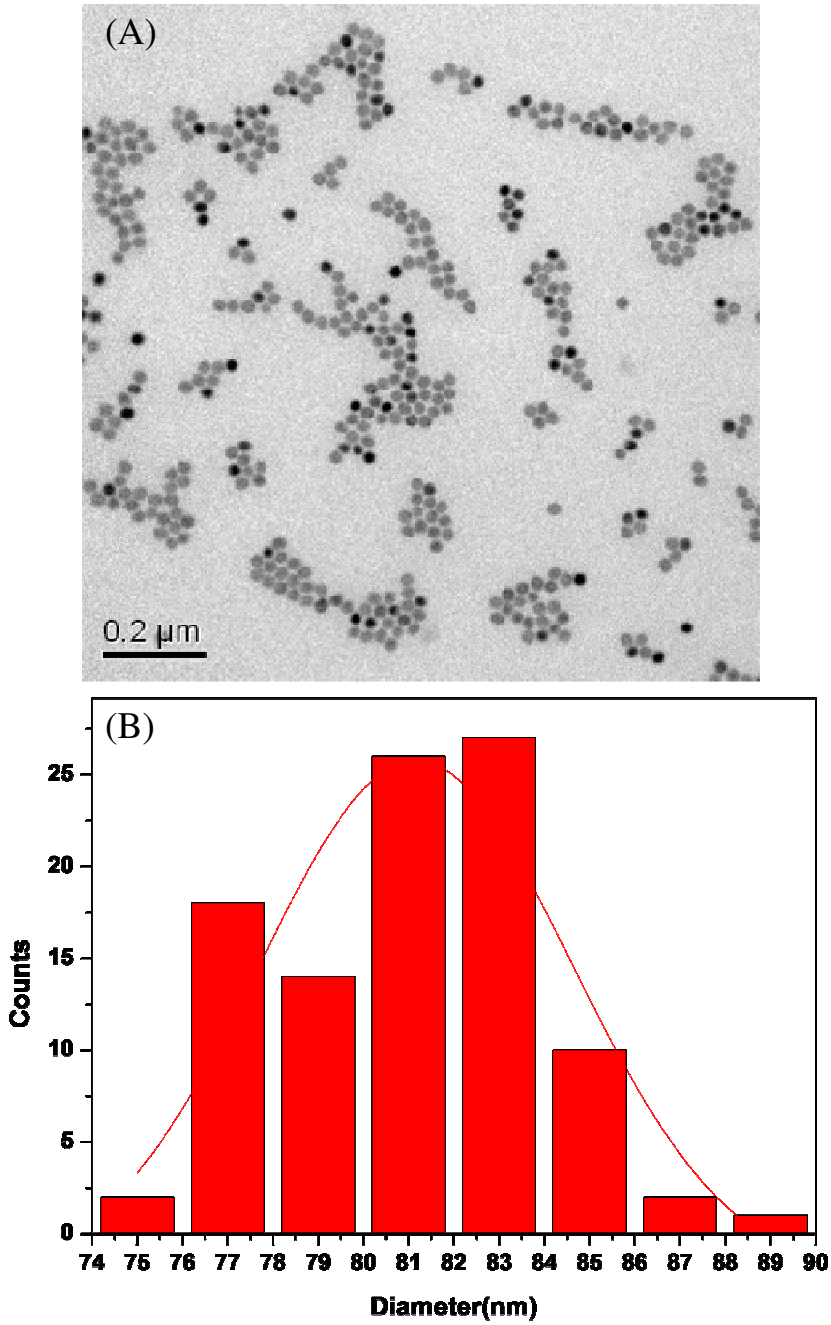
[2]Department of Chemistry, National Tsing Hua University, Hsinchu 300, Taiwan

[3]Department of Medical Imaging, Buddhist Tzu Chi General Hospital, Taipei branch, Taiwan

[4]School of Medicine, Tzu Chi University, Hualien, Taiwan

[5]Research Center for Applied Science, Academia Sinica, Taipei 115, Taiwan

*Email: chop@ntu.edu.tw (P.T.C.), jongkai@tzuchi.com.tw (J.K.H.)



Figutr S1. (A) TEM image of MnO nanocrystals dispersed in aqueous phase using CTAB as secondary surfactant. (B) The histogram analysis of H-MnO@mSiO_2(Ir)@PEG shown in Figure 1C and 1D. (100 particles are used in this histogram) The average diameter of the NPs is 81±2.8nm (σ: 3.48%).

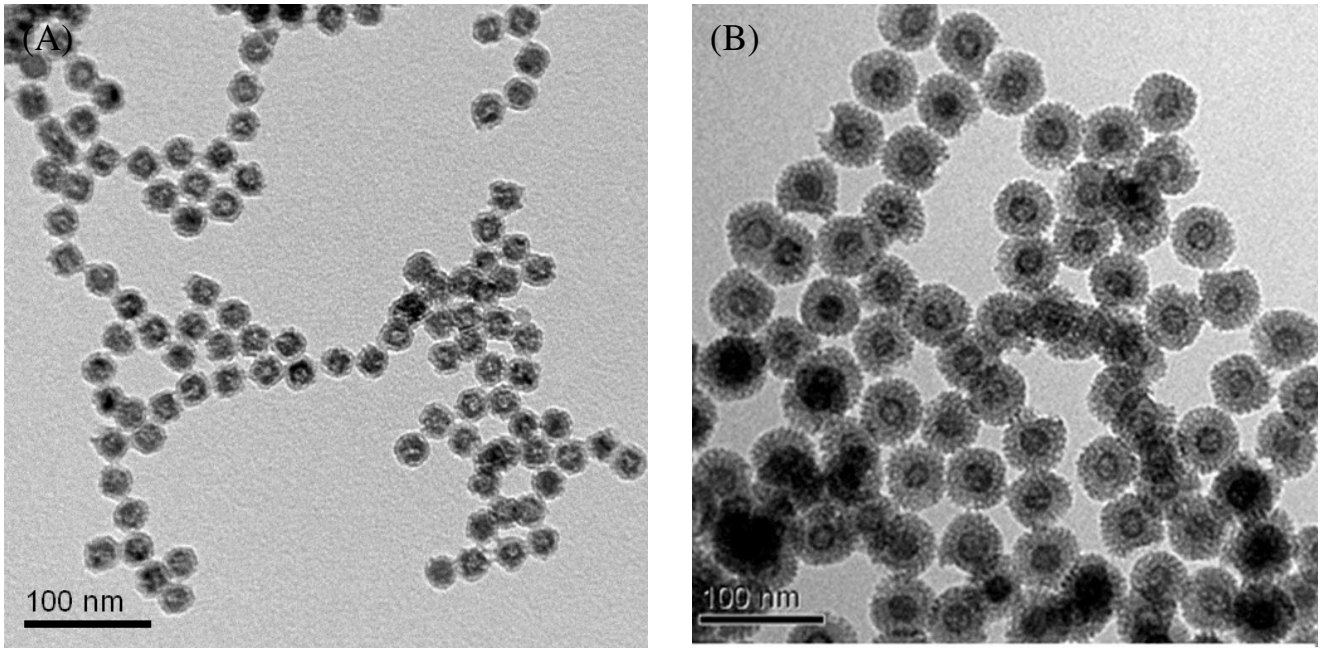


Figure S2. TEM image of different sized uniform H-MnO@mSiO$_2$(Ir)@PEG with (A) 4 nm (B) 13 nm shell.

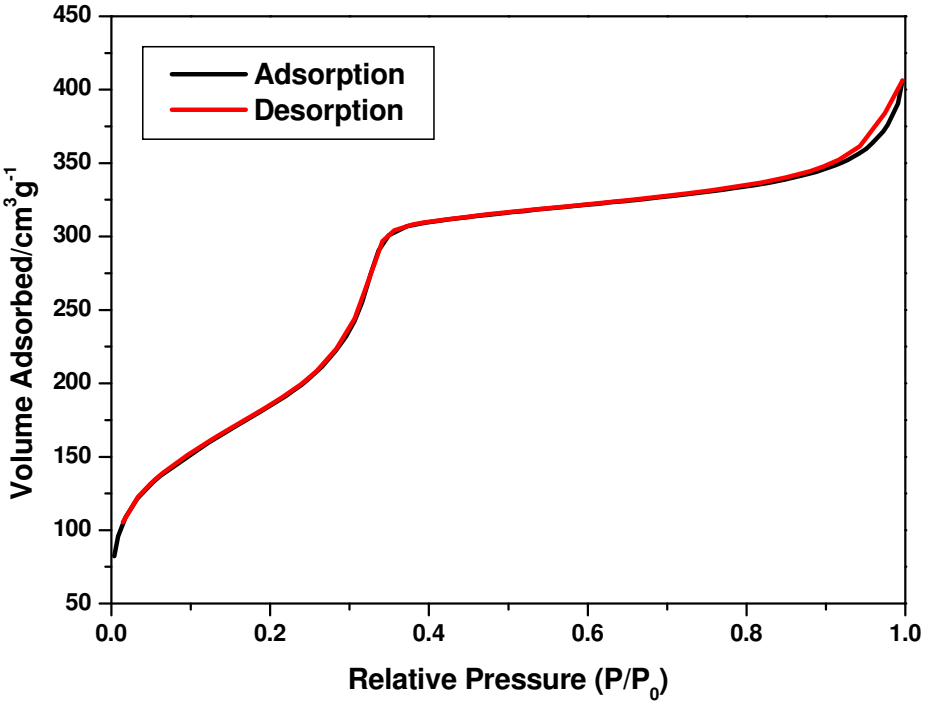


Figure S3. N_2 adsorption-desorption isotherm of H-MnO@mSiO$_2$(Ir)@PEG.

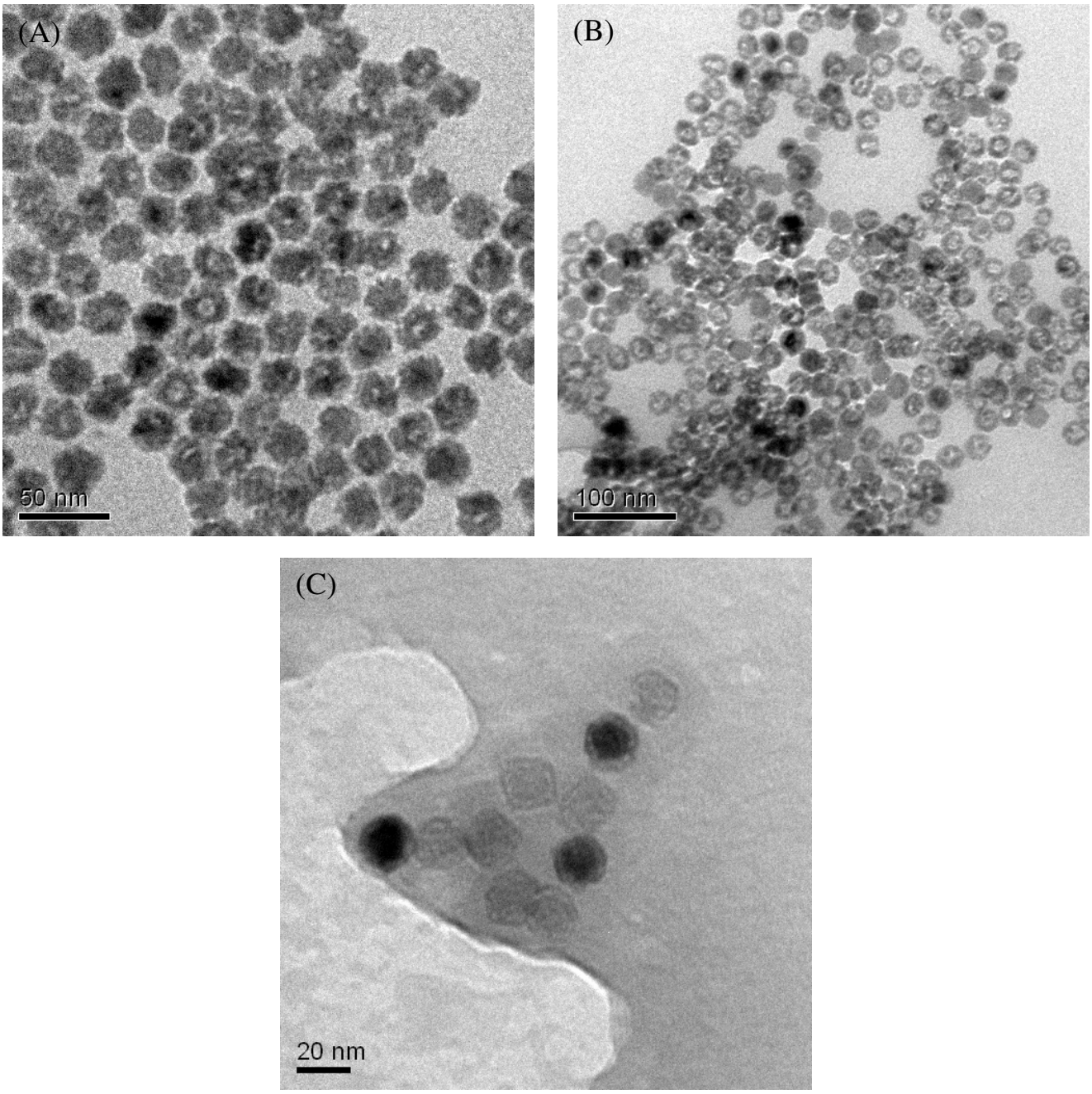


Figure S4. TEM image of MnO nanocrystals treated with (A) ethylacetate. (B, C) sodium acetate for 24 and 10 hr, respectively.

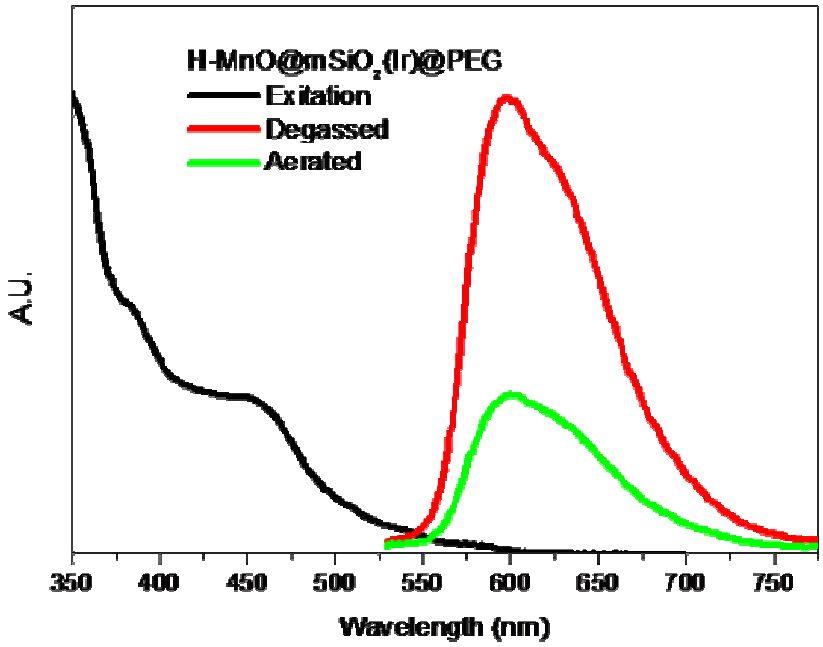


Figure S5. Excitation and emission spectra of H-MnO@mSiO$_2$(Ir)@PEG nanoparticles. The excitation spectrum (black) in degassed solution was monitored at the emission wavelength of 600 nm. Emission spectrum was measured in aerated (green) and degassed (red) aqueous solution.

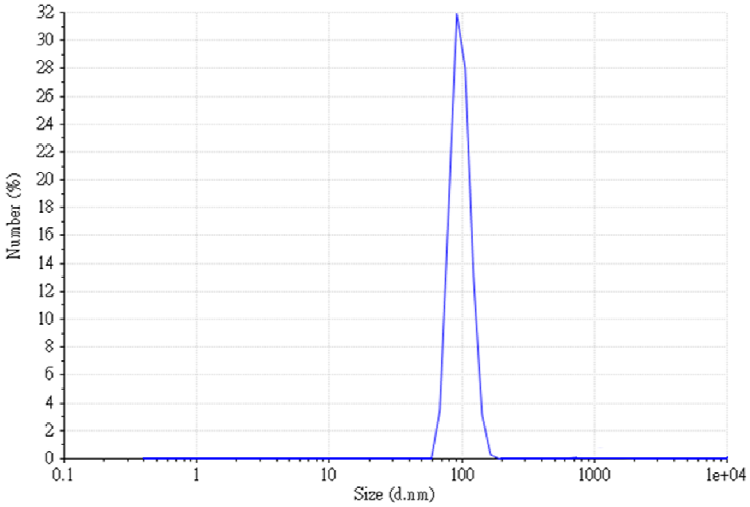


Figure S6. Dynamic light scattering (DLS) in PBS solution shows the average hydrodynamic size of the NPs is 98.4 nm.

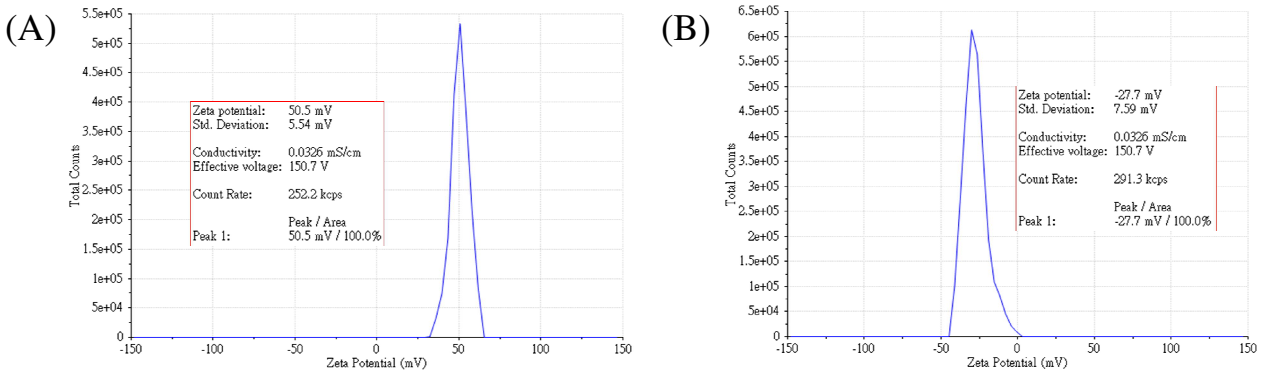


Figure S7. Zetapotential distribution shows the surface charge of (A) before (B) after CTAB extraction is 50.5 mV and -27.7 mV, respectively

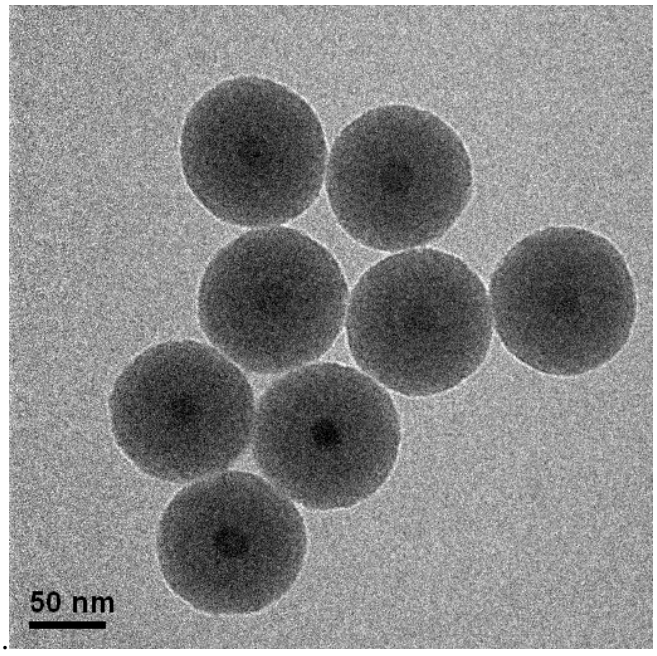


Figure S8. TEM image of $MnO@SiO_2$ nanoparticles.

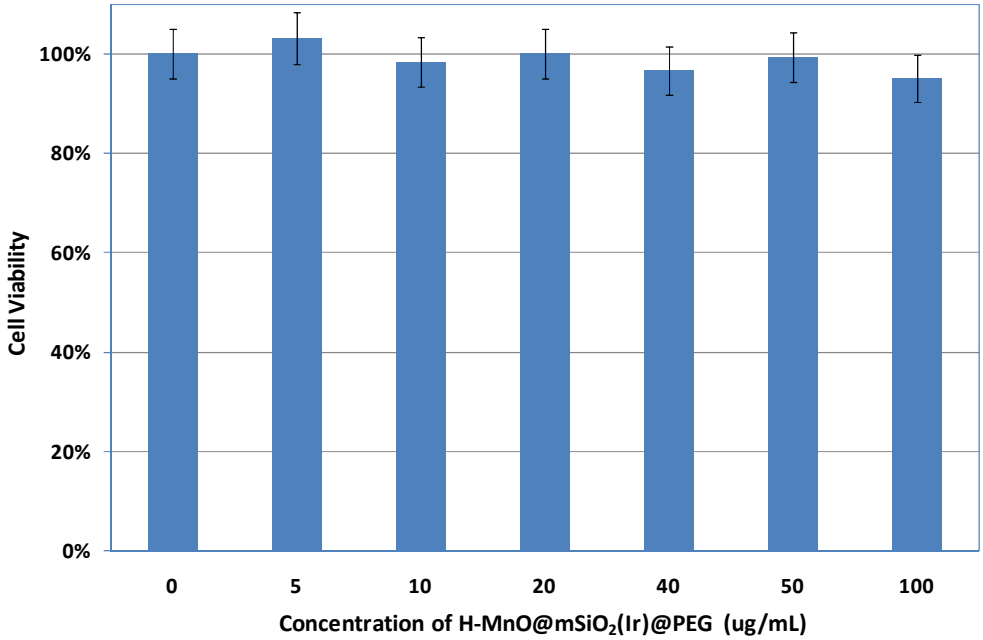


Figure S9. MTT Assay of Hela cells treated with H-MnO@mSiO$_2$(Ir)@PEG ranged from 0 to 100 μg/mL.

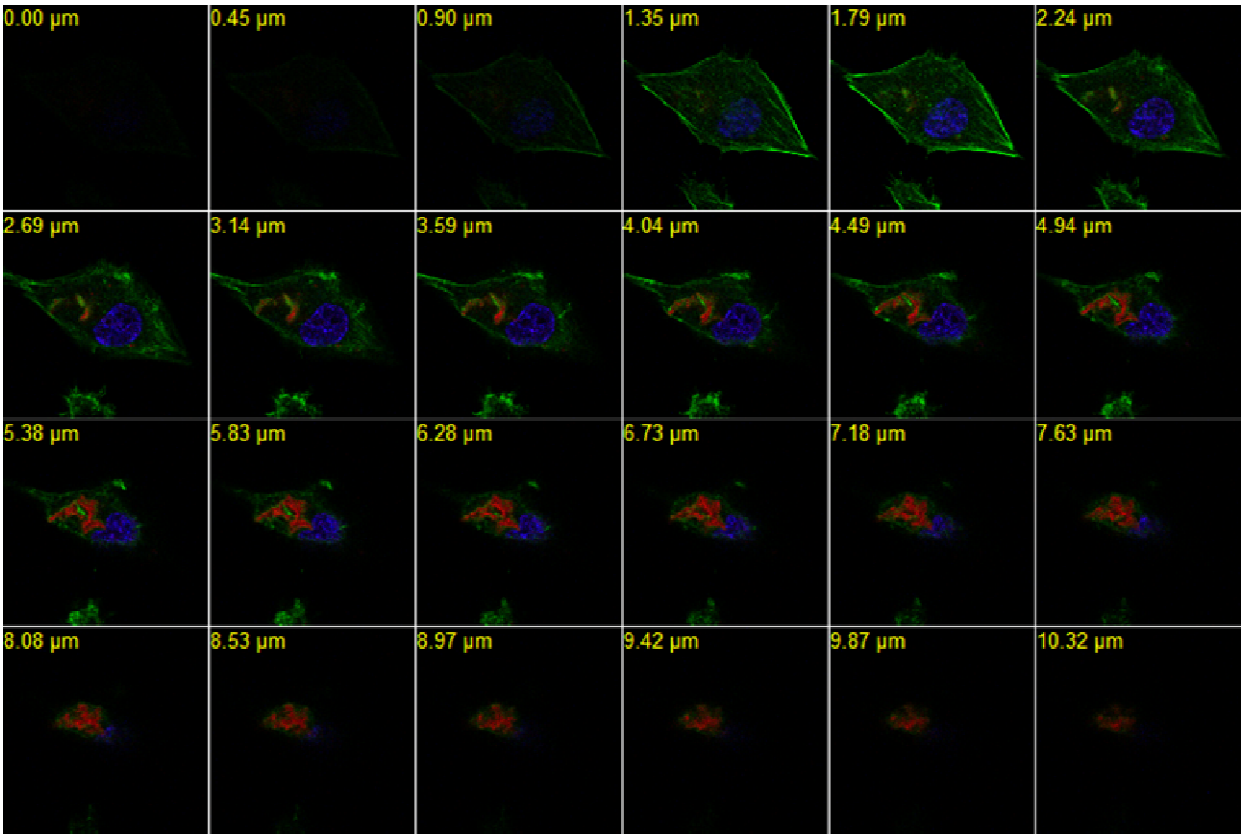


Figure S10. Confocal microscopy exam of H-MnO@mSiO$_2$(Ir)@PEG. For confirmation of the exact intracellular location of H-MnO@mSiO$_2$(Ir)@PEG, HeLa treated with H-MnO@mSiO$_2$(Ir)@PEG for 48 hours were stained with DAPI for visualization of the cell nucleus and the actin fibers were stained with Rhodamine Phalloidin. These H-MnO@mSiO$_2$(Ir)@PEG were located at cytoplasm near nucleus. No H-MnO@mSiO$_2$(Ir)@PEG was detected at the cell membrane or nucleus. The finding indicates efficient labelling and specific location characters of the H-MnO@mSiO$_2$(Ir)@PEG.