Supporting Information

Mesoporous Silica Nanoparticles with Dual-Targeting Agricultural Sources for Enhanced Cancer Treatment via Tritherapy

Yu-Ya Huang[1], Zui-Harng Lee[1], Kai-Chi Chang[2]*, Zhi-Yuan Wu[1], Cheng-Chang Lee[1], Min-Hsuan Tsou[1], Hsiu-Mei Lin[1, 3, 4]*

[1]National Taiwan Ocean University, Department of Bioscience and Biotechnology

[2]National Taiwan Ocean University, Bachelor Degree Program in Marine Biotechenology

[3]National Taiwan Ocean University, Center of Excellence for the Oceans

[4]National Taiwan Ocean University, Center of Excellence for Ocean Engineering

*Corresponding author address: No. 2, Beining Rd., Zhongzheng Dist., Keelung City 202, Taiwan (R.O.C.)

Tel./Fax: +886-2-2462-2192

E-mail: hmlin@mail.ntou.edu.tw

Table S1. Inductively coupled plasma mass spectrometry (ICP-MS) analysis of Europium (Eu), Gadolinium (Gd) and Bismuth (Bi) in rMSN, rMSN-EuGd and rMSN-EuGd-Bi.

Sample / Weight (%)	rMSN	rMSN-EuGd	rMSN-EuGd-Bi
Eu	0	2.70	2.61
Gd	0	2.83	2.71
Bi	0	0	5.80

Table S2. Zeta potentials and dynamic light scattering (DLS) particle size distributions.

	rMSN-EuGd	rMSN-EuGd-Bi	rMSN-EuGd-Bi-NH_2	rMSN-EuGd-Bi-HA	rMSN-EuGd-Bi-HA-FA
Zeta potential (mV)	-29.5 ± 0.23	-13.8 ± 0.19	-8.06 ± 0.24	-13.3 ± 0.25	12.0 ± 0.16
Particles size (nm)	248.8 ± 2.3	268.2 ± 1.9	296.3 ± 2.4	343.6 ± 2.5	350.5 ± 1.6

Table S3. Molecule content percentage of the different nanoparticles prepared by thermogravimetric analysis (TGA).

rMSN-EuGd	**-NH_2**	**-CPT**	**-HA**	**-FA**
Weight %	2.68	4.29	11.86	30.3
mg/g	34.69	55.53	135.53	393.50

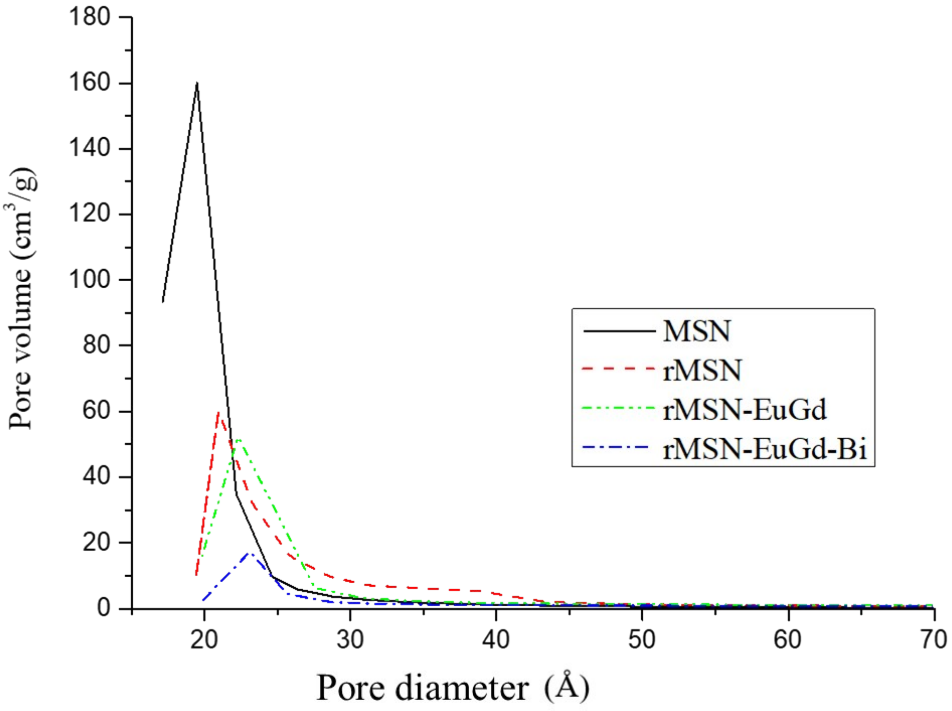


Figure S1. BJH pore size distribution curves of MSN, rMSN, rMSN-EuGd and rMSN-EuGd-Bi.

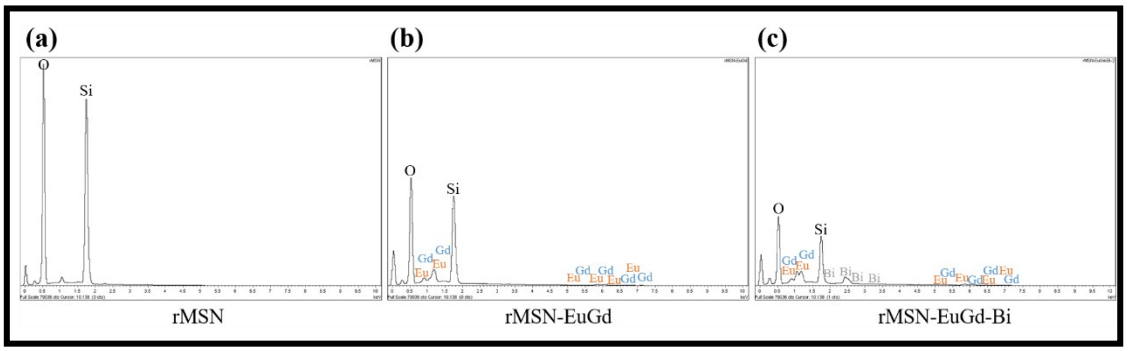


Figure S2. Energy dispersive X-ray analysis spectrum of rMSN, rMSN-EuGd and rMSN-EuGd-Bi.

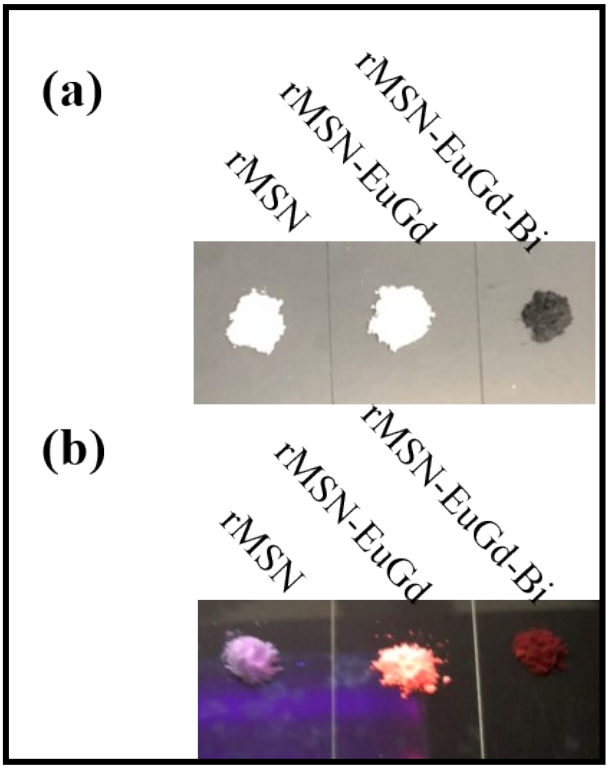


Figure S3. Images of rMSN, rMSN-EuGd and rMSN-EuGd-Bi (a) irradiated by a natural light source and (b) irradiated by ultraviolet light with 254 nm.

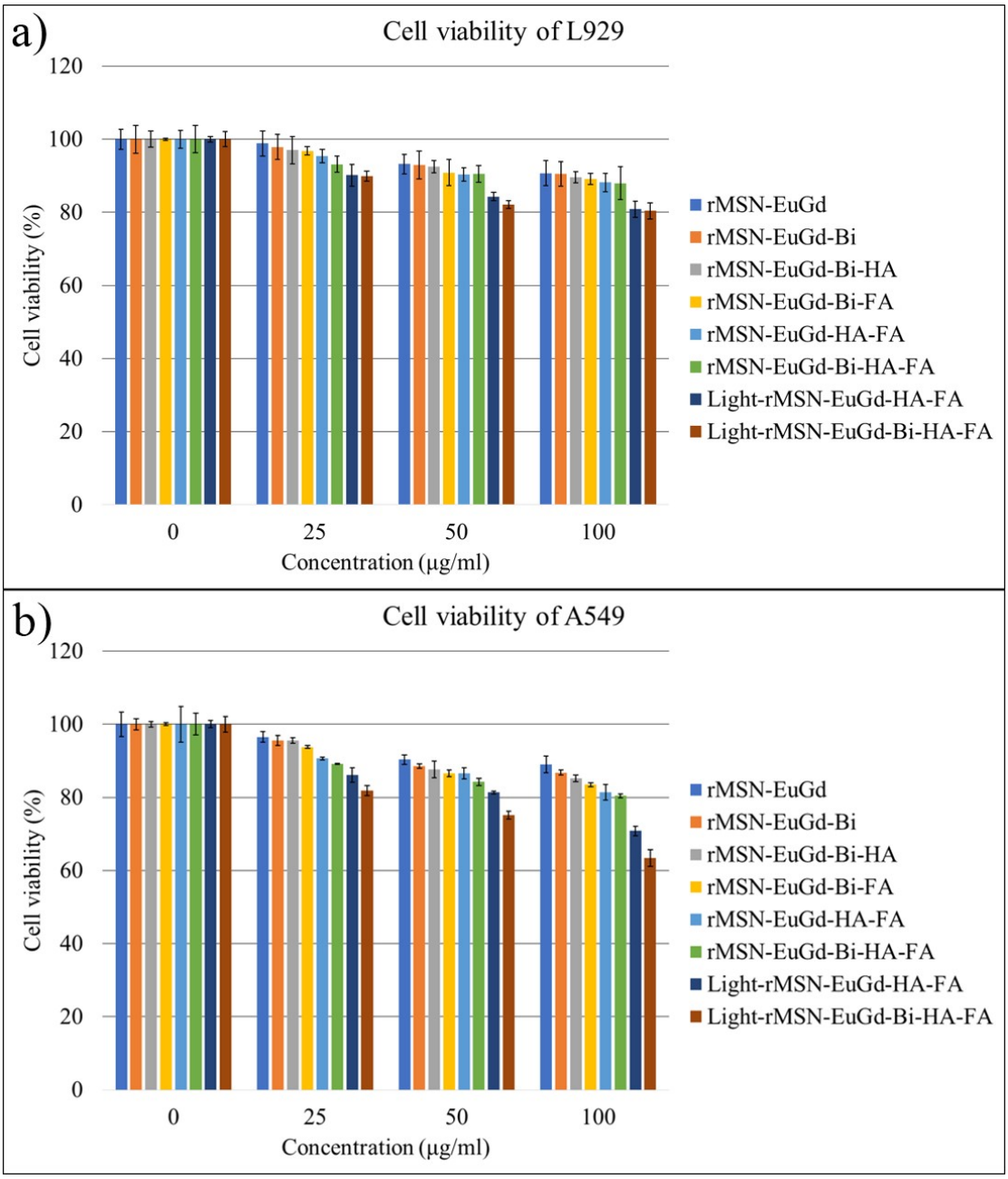


Figure S4. MTT assays of 0-100 μg/ml rMSN-EuGd, rMSN-EuGd-Bi, rMSN-EuGd-Bi-HA, rMSN-EuGd-Bi-FA, rMSN-EuGd-HA-FA, rMSN-EuGd-Bi-HA-FA, Light-rMSN-EuGd-HA-FA, and Light-rMSN-EuGd-Bi-HA-FA (lighting condition: 808 nm irradiation for 15 mins) to a) L929 cell; b) A549 cell.

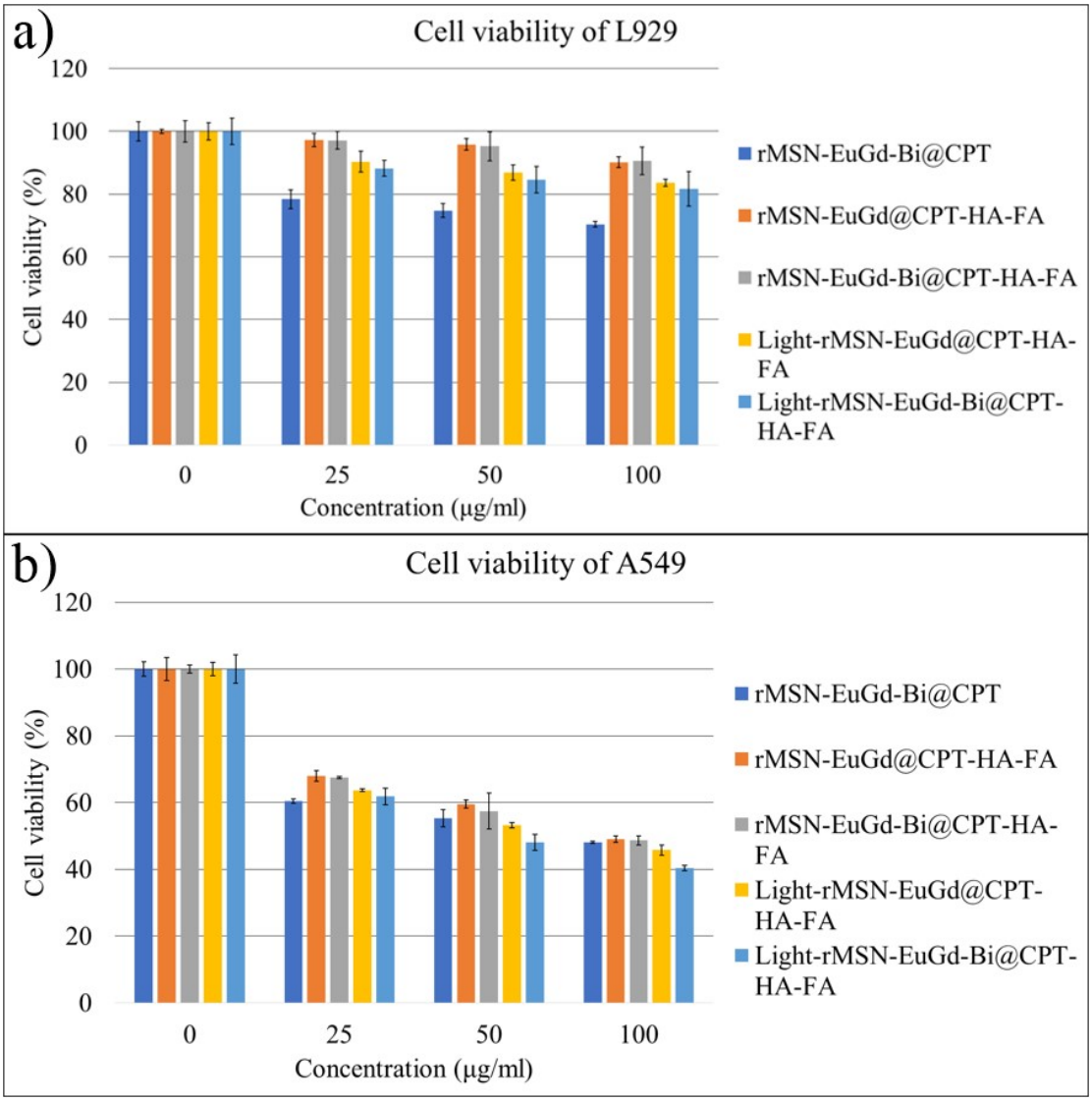
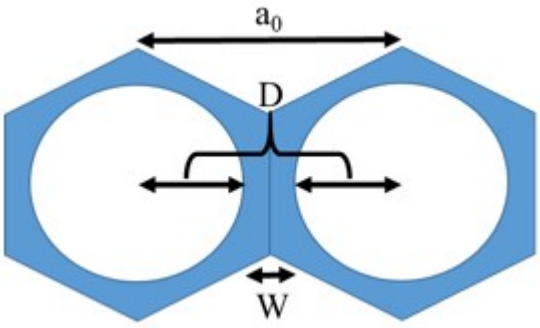


Figure S5. MTT assays of 0- 100 μg/ml rMSN-EuGd-Bi@CPT, rMSN-EuGd@CPT-HA-FA, rMSN-EuGd-Bi@CPT-HA-FA, Light-rMSN-EuGd@CPT-HA-FA and Light-rMSN-EuGd-Bi@CPT-HA-FA (lighting condition: 808 nm irradiation for 15 mins) to a) L929 cell; b) A549 cell.



D: Pore diameter
W: Aperture Inner Wall Thickness
a_0: Unit cell parameters
d100: Distance between 100 lattice faces

$$d100 = a_0 \times \frac{\sqrt{3}}{2}$$

$$a_0 = D + W$$

Figure S6. Structural parameters of mesoporous materials.