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## **Supporting Information**

## A peptide-lipid nanoparticle assembly platform with integrated

## functions for targeted cell delivery

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**Figure S1.** DLS measurements of A-LNP and ALA-LNPs. (A-D) A-LNP,  $AL_3A$ -LNP,  $AL_5A$ -LNP,  $AL_7A$ -LNP respectively. Averages ± SD of three experiments are presented.



Figure S2. Circular dichroism (CD) spectra for the A and ALA peptides in PBS buffer, pH 7.4.

	Size (nm)	Zeta potential (mV)	Encapsulation efficiency(%)
AL <sub>3</sub> A-LNP(Ir)	$26.4 \pm 0.7$	$-1.86 \pm 0.25$	68.9±6.7
A(His)5A-LNP(Ir)	$21.3 \pm 0.7$	$2.39 \pm 0.55$	$62.5 \pm 3.3$
A(RGD)A-LNP(Ir)	$22.7 \pm 0.5$	$-1.94 \pm 0.65$	59.4±5.1

Table S1 The size, zeta potential and encapsulation efficiency of Ir(ppy)<sub>2</sub>-DIP-load lipid nanoparticles



**Figure S3.** Test of long-term size change of  $AL_{(3,5,7)}A$ -LNPs. The  $AL_{(3,5,7)}A$ -LNPs were stored in PBS at 4°C and the diameters of lipid nanoparticles were measured using dynamic light scattering (DLS) over a period of 20 days. Averages ± SD of three experiments are presented.





Figure S4. DLS measurements (A) and TEM image (B) of A(His)<sub>5</sub>A-LNP(Ir).





Figure S5. DLS measurements (A) and TEM image (B) of A(RGD)A-LNP(Ir).

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**Figure S6.** Hemolysis assay for A(RGD)A-LNP(Ir) and Ir(ppy)<sub>2</sub>-DIP. Various concentration of Ir(ppy)<sub>2</sub>-DIP, A(RGD)A-LNP(Ir) were incubated with RBC at 37°C for 1h. Averages  $\pm$  SD of three experiments are presented.



**Figure S7.** Cytotoxicity assay of A(RGD)A-LNP(Ir) and Ir(ppy)<sub>2</sub>-DIP in noncancer HLF cells and HT1080 fibrosarcoma. Averages ± SD of three experiments are presented.

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**Figure S8.** Cytotoxicity assays of A(RGD)A-LNP(Ir), AL<sub>3</sub>A-LNP(Ir), A(RGD)A-LNP to HT 1080 at 20  $\mu$ M concentration. Averages ± SD of three experiments are presented.



Figure S9. Electrospray-ionization mass spectra of AL<sub>3</sub>A peptide. Calculated: 3904.42; Found: 3904.8.



Figure S10. Electrospray-ionization mass spectra of AL<sub>5</sub>A peptide. Calculated: 4048.55; Found: 4048.2.



Figure S11. Electrospray-ionization mass spectra of AL<sub>7</sub>A peptide. Calculated: 4192.68; Found: 4192.8.



**Figure S12.** Electrospray-ionization mass spectra of A(His)<sub>5</sub>A peptide. Calculated: 4358.91; Found: 4358.7.



**Figure S13.** Electrospray-ionization mass spectra of A(RGD)A peptide. Calculated: 3960.52; Found: 3960.0.



**Figure S14.** Electrospray-ionization mass spectra of A(SRGDS)A peptide. Calculated: 3971.39; Found: 3970.8.