Electronic Supplementary Information

Hyaluronic acid based carbon dots for efficient gene delivery and cell imaging

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Table S1. The hydrodynamic size of the HA-Cds without DNA.Data represent mean ±SD (n = 3)

HA-Cds	HA-CP5	HA-CP10	HA-CP20	HA-CP30	HA-CP40	HA-CP50
Particle size (nm)	45.1±4.2	44.1±2.2	43.9±1.1	34.6±2.5	31.3±2.7	27.2±1.9

Table S2. The C, N and H content of the HA-Cds by elemental analysis

	HA-CP5	HA-CP10	HA-CP20	HA-CP30	HA-CP40	HA-CP50
C (%)	40.31	38.28	39.62	39.86	40.40	40.68
N (%)	14.27	13.86	14.61	14.27	14.27	14.86
H (%)	8.60	8.35	8.87	8.65	8.54	8.74

Table S3. Quantum yield (YQ) of HA-Cds

	HA-CP5	HA-CP10	HA-CP20	HA-CP30	HA-CP40	HA-CP50
YQ (%)	3.46%	3.60%	2.92%	2.81%	2.43%	2.47%

Table S4. The stability of **HA-CP10**. Data represent mean ±SD (n = 3)

Media	Particle size (nm)		
	1 day	2 days	3 days
FBS (10%)	113.8±0.7	113.8±0.7	115.7±0.2
BSA (0.1 mg / mL)	44.0±3.0	43.0±2.8	42.2±3.1
BSA (0.2 mg / mL)	42.7±1.4	35.0±0.5	35.9±1.3

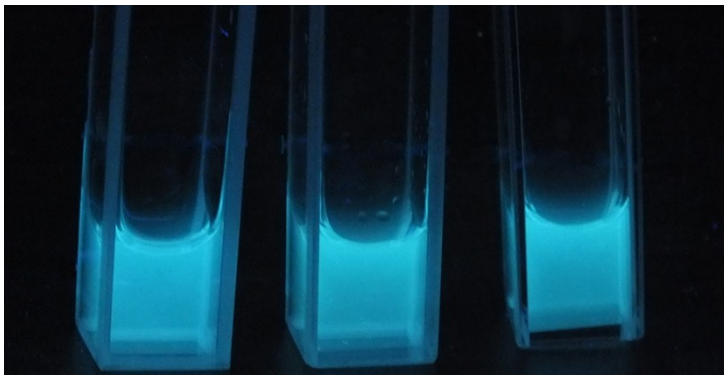

Fig. S1. Aqueous HA-Cds solutions under UV light illumination (365 nm, from left to right: **HA-CP30**, **HA-CP40** and **HA-CP50**).

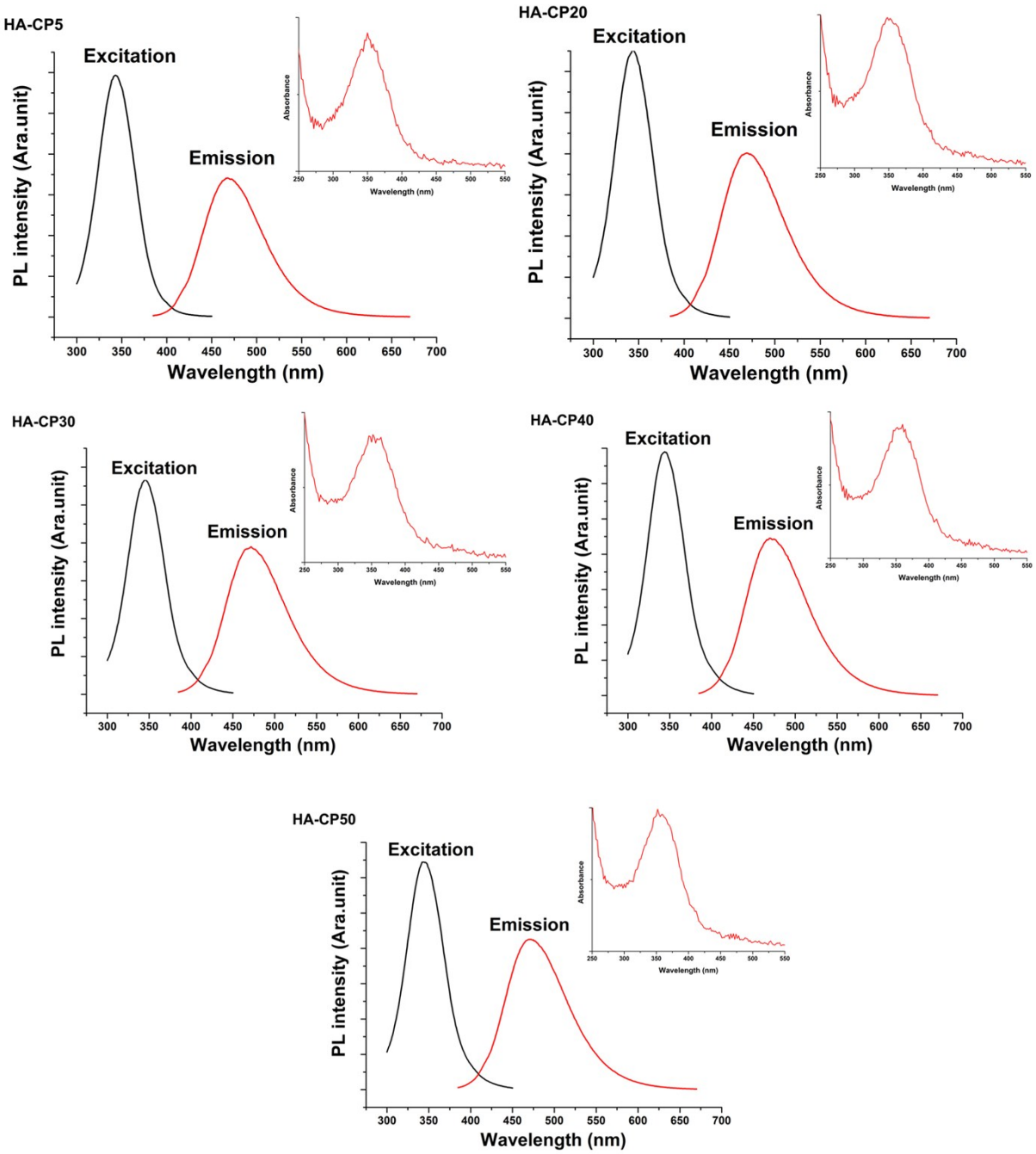

Fig. S2. Photoluminescence (PL) and UV spectra (insert) of **HA-CP5**, **HA-CP20**, **HA-CP30**, **HA-CP40** and **HA-CP50**.

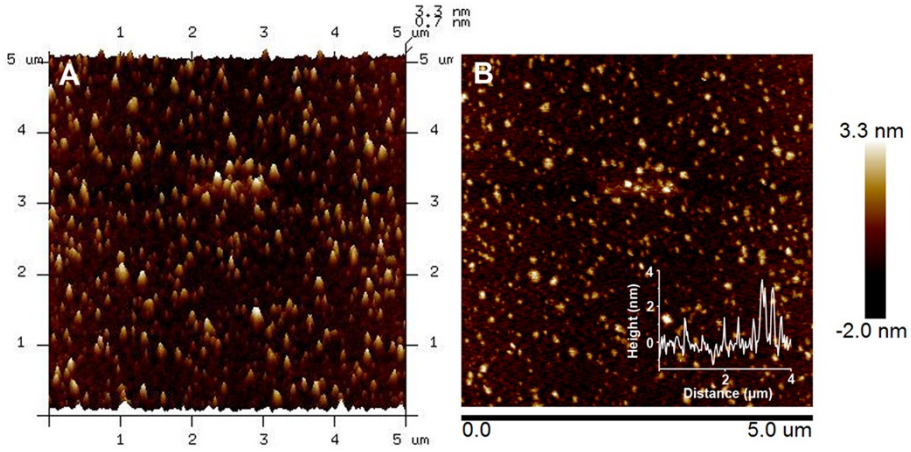

Fig. S3. The atomic force microscopy images of **HA-CP10**, (A) 3D image, (B) 2D image.

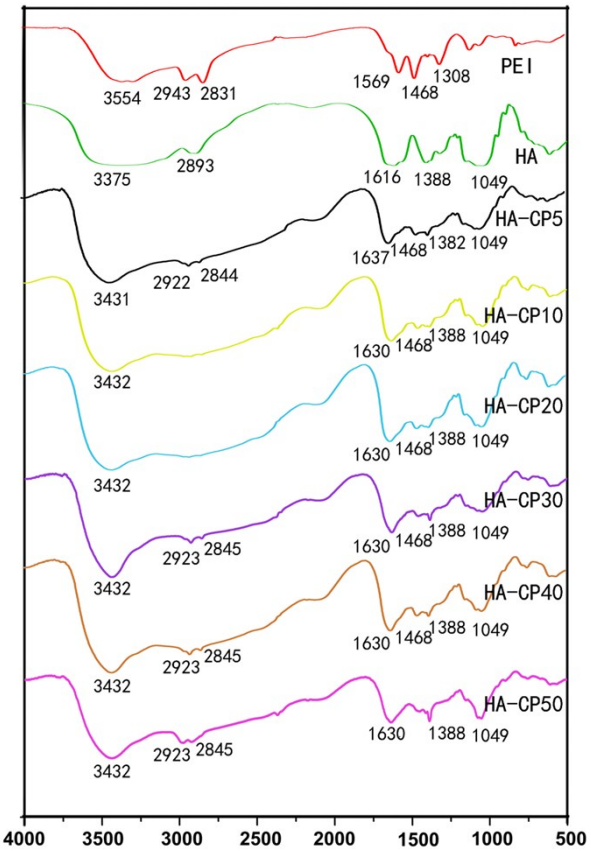

Fig. S4. FT-IR spectra of raw PEI, HA and HA-Cds.

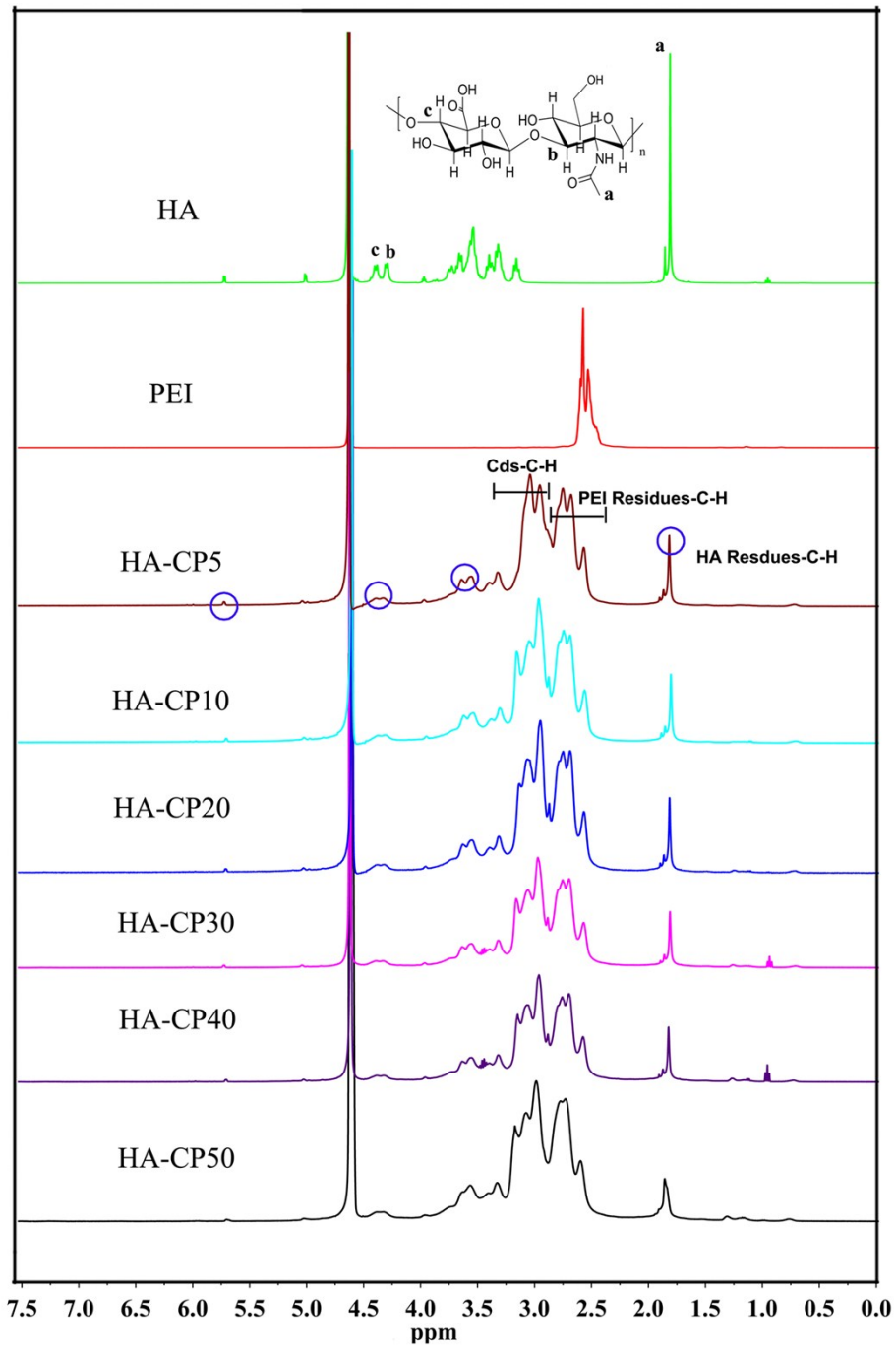

Fig. S5. ^{1}H NMR spectra of HA-Cds.

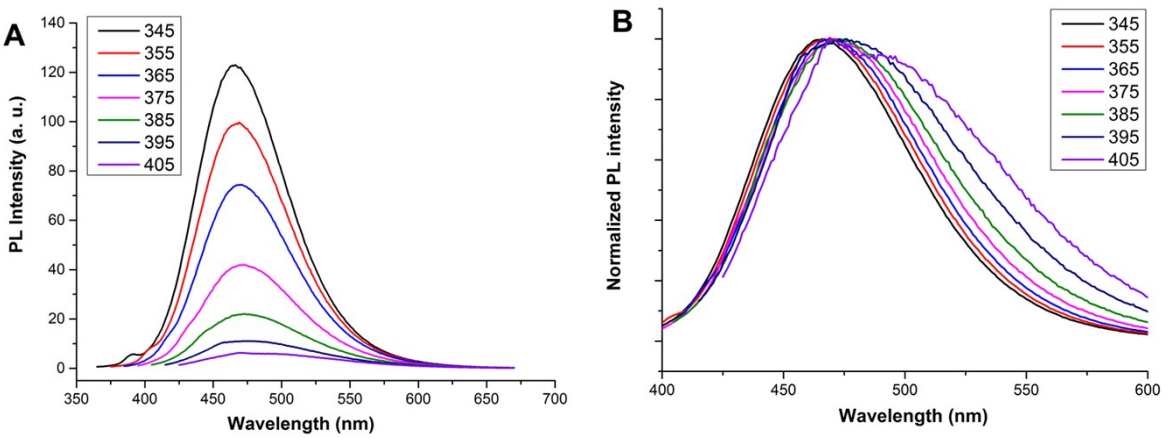

Fig. S6. Excitation-dependent (A) and normalized (B) Photoluminescence emission spectra of **HA-CP10**.

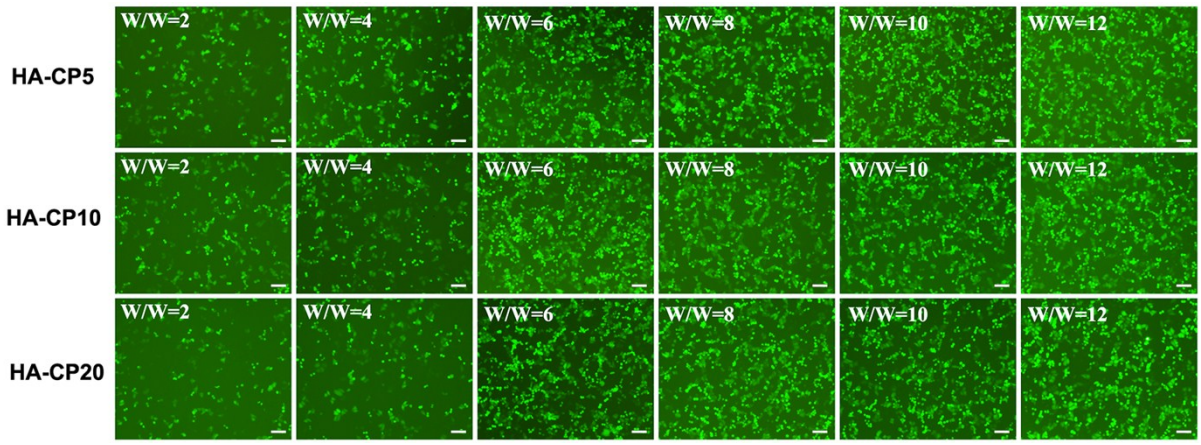

Fig. S7. Fluorescence microscope images of pEGFP-transfected HeLa cells in the absence of serum. Scale bar = 50 μm

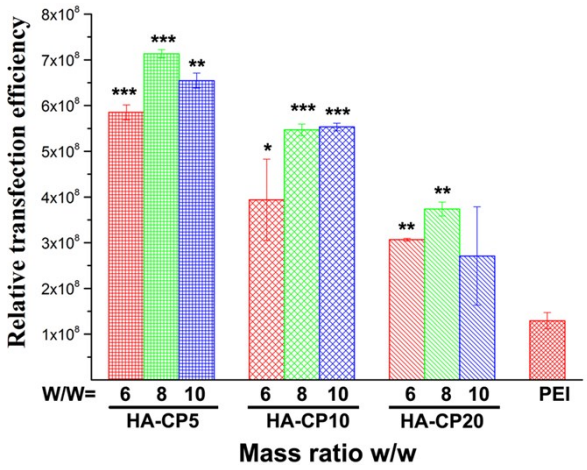

Fig. S8. Luciferase gene expression transfected by HA-Cds/DNA complexes at different weight ratios in comparison with 25 kDa PEI (N/P = 10) in HEK293 cells in the presence of serum. Data represent mean ± SD (n = 3,*P < 0.05; **P < 0.01; ***P < 0.001 *vs.* PEI).

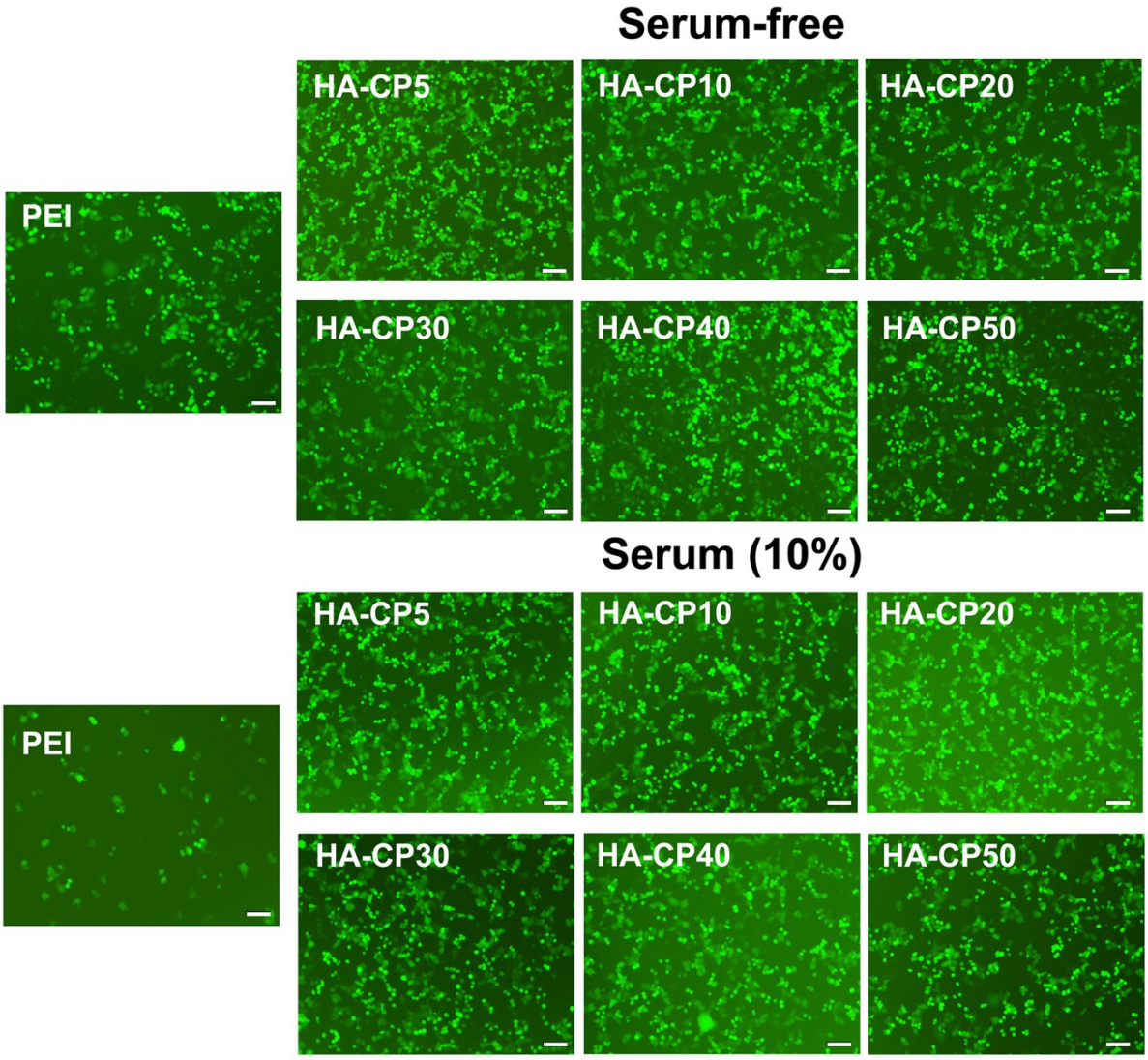

Fig. S9. Fluorescence microscope images of pEGFP-transfected HeLa cells in the absence and presence of 10% serum, 25 KDa PEI was used for comparison. (w/w = 10). Scale bar = 50 μm.

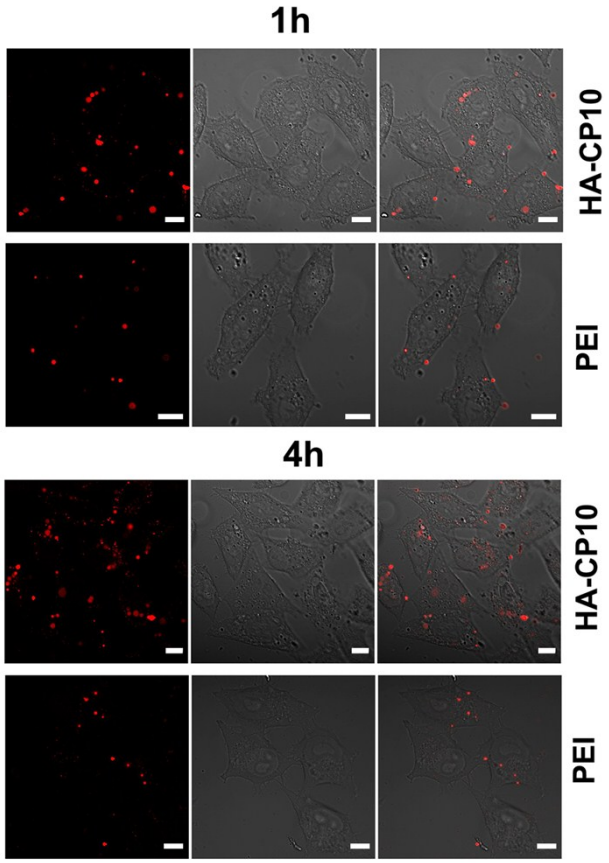

Fig. S10. CLSM images of HeLa cells transfected with **HA-CP10**/DNA complex in the presence of 10% serum. Scale bar = 10 μm.