

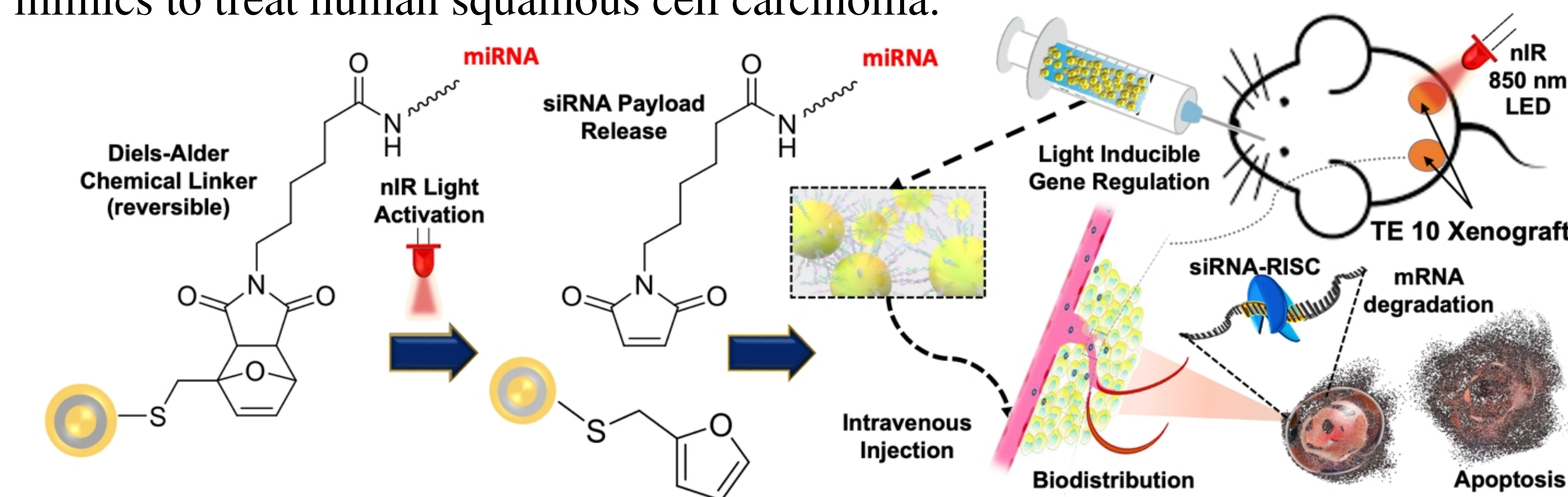
Light Inducible Drug Delivery and Release (LADDR) for Delivery of miRNA Mimics to Tumors

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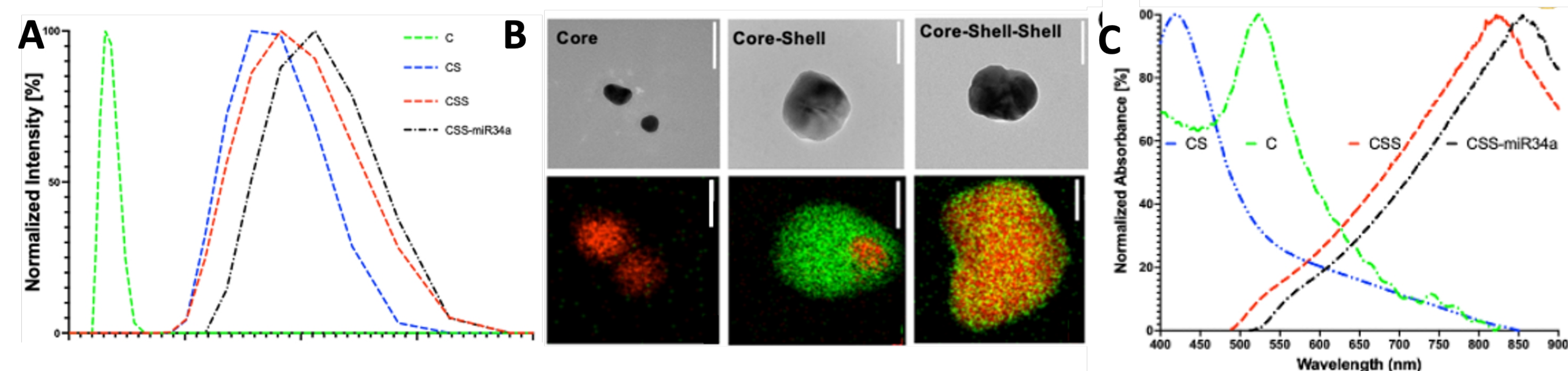
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Controlled Nucleic Acid Delivery

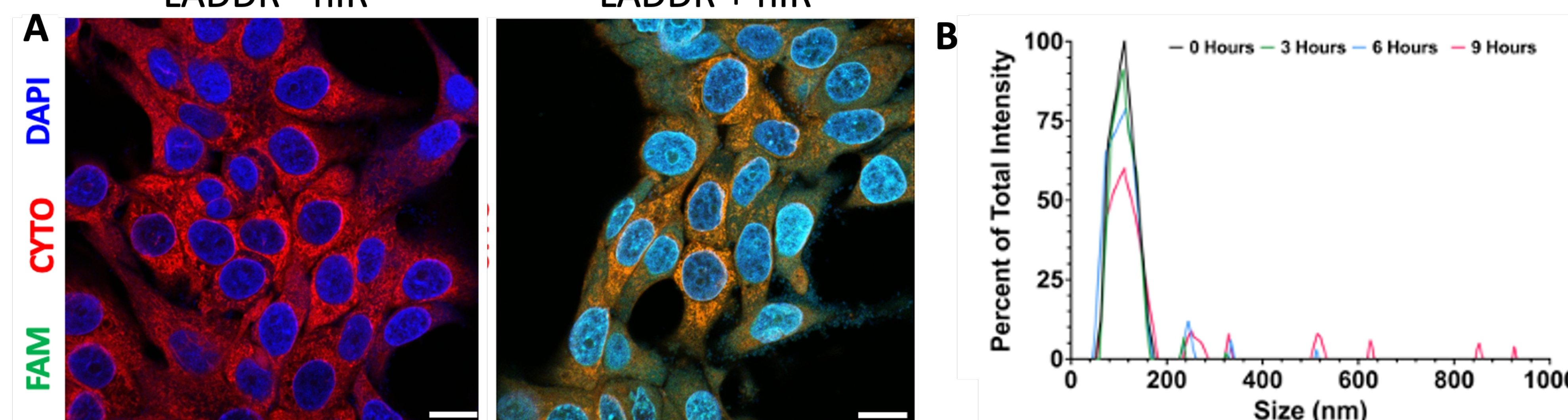
Current nucleic acid therapy delivery methods are limited by poor in vivo pharmacokinetics and a lack of tissue specific activity which can result in low activity and severe side effects. This system delivers therapeutics with precise spatiotemporal control, achieving tumor-specific selectivity, and efficient delivery of miRNA mimics. The near-infrared, light-inducible particles leverage the surface plasmonic resonance to generate photothermal heating, plasmonic fields and electron injection for controlled chemical cleavage and release of miR-34a-5p mimics to treat human squamous cell carcinoma.



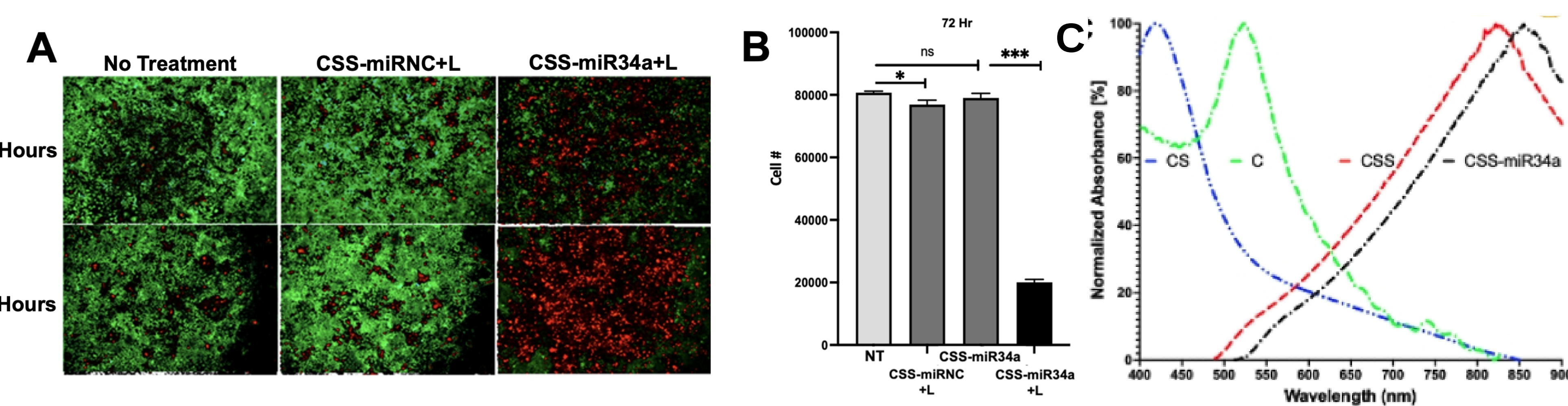
Characterization and In Vitro Results



- (A) Nanoparticle size distribution from synthesis of the base, gold-core seed, through shell formation as measured by DLS. (B) Nanoparticle morphology and elemental composition detected using TEM equipped with EDS technology. Scale bar 50 nm. STEM/EDS images, red color is gold, and green color is silver.

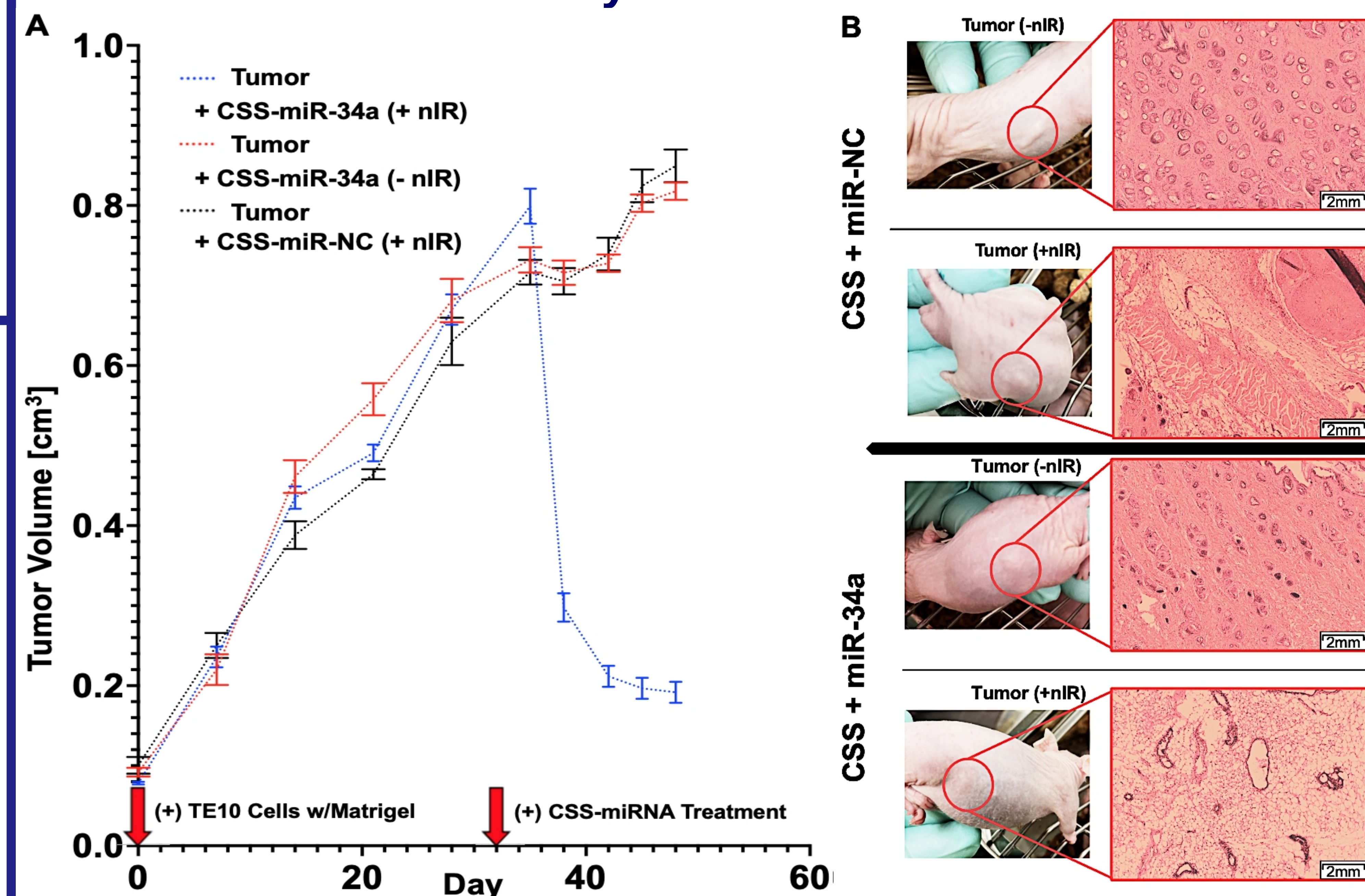


- (A) Confocal Fluorescent images of TE10 cells with LADDR-miR34a mimic nanoparticles that received no irradiation at 850 nm (Left). TE10 cells treated with FAM-tagged LADDR-miR34a nanoparticles and irradiated with 850 nm for miRNA mimic release (Right). (B) Colloidal stability of LADDR-miR34a nanoparticles in cell media at 37°C. Scale bar 10 µm. Blue: NucBlue/DAPI; Red: Cell-Tracker Red; Green: FAM.



- (A) Live/Dead and (B) PicoGreen assessment of TE10 cells treated with CSS-miRNA groups. “+L” indicates that near-IR irradiation. n=3. * = p < 0.05, *** = p < 0.001.

In Vivo Delivery and Tumor Reduction



- (A) Quantification of tumor volume over time before, during and after treatment with the CSS-miRNA nanoparticle treatment groups. n=6 (B) Histological analysis via H&E-stained sections are stained pink, cell nuclei in purple, (Scale bar is 2mm).

Acknowledgements

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Key References

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- Kumal, R.R., et al., *Near-Infrared Photothermal Release of siRNA from the Surface of Colloidal Gold-Silver-Gold Core-Shell-Shell Nanoparticles Studied with Second Harmonic Generation*. The Journal of Physical Chemistry C, 2018. **122**(34): p. 19699-19704.