Two-Photon Light Assisted Therapies With Porous Silicon Nanoparticles

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In cancer treatment, the development of localized therapies offers a promising strategy to minimize the adverse effects commonly associated with systemic drug administration. By directly targeting the tumor site, such approaches may also help preserve organ function or enable limited surgical resection in the case of small tumors. Moreover, localized treatments can address the intrinsic biological resistance observed in certain aggressive or treatment-refractory cancers, where conventional therapies often fail. Our objective is to develop biodegradable, mesoporous silicon-based materials designed for the local treatment of cancer. Porous silicon nanostructures are bioresorbable in vivo, thus highly suitable for biomedical applications. Additionally, they can be excited using near-infrared two-photon excitation, enabling their use in phototherapies and light-triggered treatments. We will present the development of photoactive porous silicon nanostructures functionalized with organic ligands, designed for a range of applications including imaging, photodynamic therapy and light-trigger nucleic acid delivery.

References

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Figures

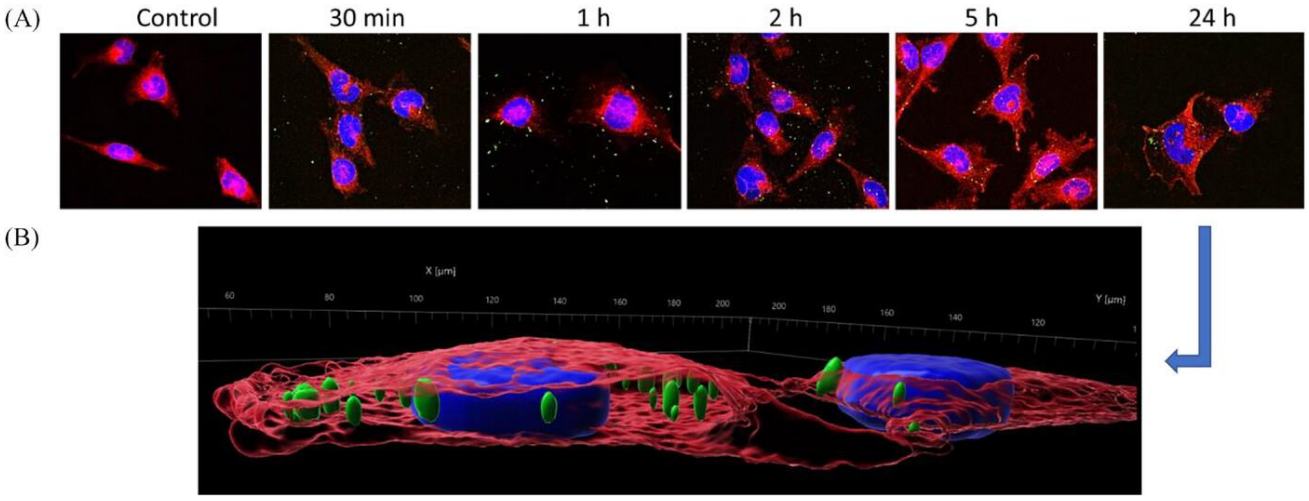

Figure 1: Internalization of pSiNP@AMFA@FITC in rhabdomyosarcoma cells. A, RD living cells were incubated with pSiNp@AMFA@FITC at 40 µg mL^{-1} during increasing times from 0.5 to 24 hours, and visualized with Zeiss LSM710 confocal microscope. The nuclei were stained with DAPI (blue) membrane cells were stained with CellMask (red) and pSiNP@AMFA@FITC appears in green after excitation at 488 nm. B, Three-dimensional reconstruction of the data obtained at 24 hours incubation time. Control = untreated cells.