Special Section On Nanophotonics For Diagnostics, Protection, And Treatment Of Cancer And Inflammatory Diseases

Cancer photothermal therapy in the near-infrared region by using single-walled carbon nanotubes

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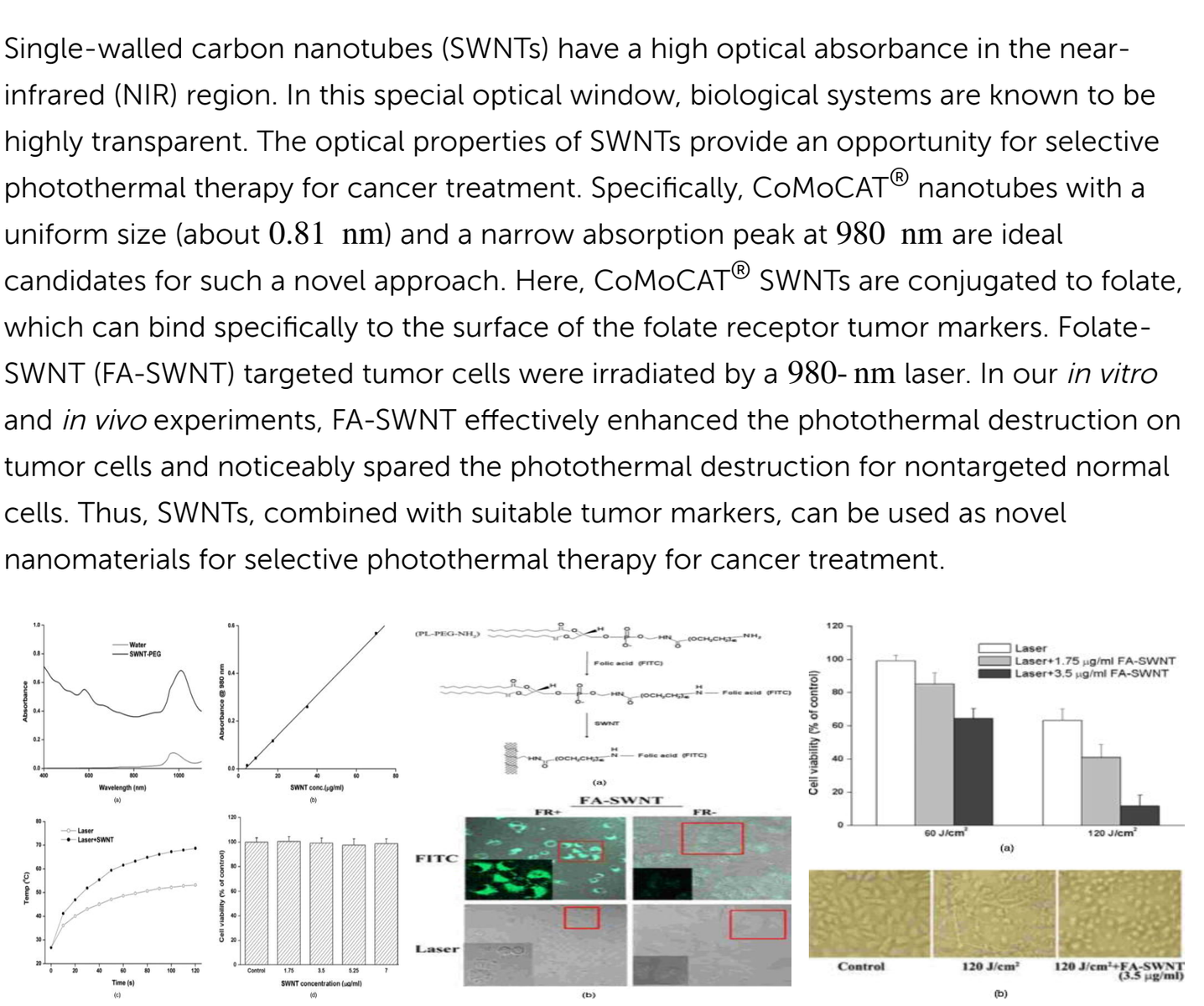
Abstract

Single-walled carbon nanotubes (SWNTs) have a high optical absorbance in the near-infrared (NIR) region. In this special optical window, biological systems are known to be highly transparent. The optical properties of SWNTs provide an opportunity for selective photothermal therapy for cancer treatment. Specifically, CoMoCAT® nanotubes with a uniform size (about $0.81\ \mathrm{nm}$) and a narrow absorption peak at $980\ \mathrm{nm}$ are ideal candidates for such a novel approach. Here, CoMoCAT® SWNTs are conjugated to folate, which can bind specifically to the surface of the folate receptor tumor markers. Folate-SWNT (FA-SWNT) targeted tumor cells were irradiated by a $980\text{-}\mathrm{nm}$ laser. In our *in vitro* and *in vivo* experiments, FA-SWNT effectively enhanced the photothermal destruction on tumor cells and noticeably spared the photothermal destruction for nontargeted normal cells. Thus, SWNTs, combined with suitable tumor markers, can be used as novel nanomaterials for selective photothermal therapy for cancer treatment.



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Topics

Single walled carbon nanotubes ; Cancer ; Lasers ; Absorption ; Near infrared

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