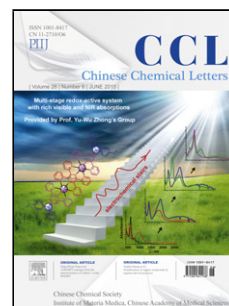


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Communication

# Fabrication of a polypseudorotaxane nanoparticle with synergistic photodynamic and chemotherapy

Tao-Tao Xu<sup>a</sup>, Jun-Hua Li<sup>a</sup>, Fu-Rong Cheng<sup>a</sup>, Yi-Xin Zhang<sup>b</sup>, Jun Cao<sup>a</sup>, Wen-Xia Gao<sup>c</sup>, Bin He<sup>a,\*</sup>

<sup>a</sup> National Engineering Research Center for Biomaterials, Sichuan University, Chengdu 610064, China

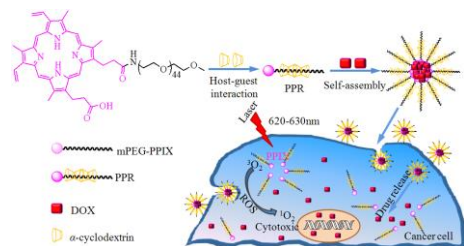
<sup>b</sup> School of Chemical Engineering, Sichuan University, Chengdu 610065, China

<sup>c</sup> College of Chemistry and Materials Engineering, Wenzhou University, Wenzhou 325027, China

\* Corresponding author.

E-mail address: bhe@scu.edu.cn (B. He)

Graphical abstract



Polypseudorotaxane (PPR) nanoparticles were fabricated by the self-assembly of mPEG-protoporphyrin IX (PpIX) conjugate and  $\alpha$ -CDs via the host-guest interaction for achieving synergistic photodynamic and chemotherapy.

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## ABSTRACT

A polypseudorotaxane (PPR) nanoparticle was fabricated by the self-assembly of mPEG-protoporphyrin IX (PpIX) conjugate and  $\alpha$ -CDs via the host-guest interaction. The nanoparticle loaded with anticancer drug doxorubicin (DOX) exerted synergistic photodynamic and chemotherapy. The nanoparticle was spherical with the mean size of 89 nm, the low critical micelle concentration (CMC) of DOX-loaded nanoparticle was 9.3  $\mu$ g/mL and the drug loading content was 9.93%. The in vitro anticancer activity test revealed that the DOX-loaded nanoparticle exhibited promising reactive oxygen species (ROS) cytotoxicity and chemotherapeutic efficacy to cancer cells. The PPR nanoparticle is potentially promising for synergistic photodynamic and chemotherapy for cancers

Synergistic cancer therapy had attracted more and more attention for high efficient cancer therapy [1-4]. The theranostic nanoparticles (NPs) integrated with diagnostic imaging and therapeutic capabilities to realize imaging-guided drug delivery and tumor treatment [5,6]. The platform combined with multiply treatments avoided drug resistance comparing to single chemotherapy [7,8]. In recent years, the development of photodynamic therapy (PDT) generating reactive oxygen species (ROS) including singlet oxygen ( $^1\text{O}_2$ ) and oxygen radicals became an effective cancer treatment [9-12]. The combination of photodynamic therapy and chemotherapy had exhibited promising effect on cancer therapy [13,14]. Most photosensitizers in PDT were hydrophobic molecules and inconvenient for

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