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Overcoming the limits in photodynamic therapy: Facile supramolecular method to nucleicacid-driven activatable nanotheranostics

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Supramolecular chemistry provides a "bottom-up" method to fabricate nanostructures for biomedical applications. Hence, we report a facile strategy to directly assemble a phthalocyanine photosensitizer (PcS) with an anticancer drug mitoxantrone (MA) to form uniform nanostructures (PcS-MA), which not only display nanoscale optical properties but also have the capability of undergoing nucleic acid-responsive disassembly. Focused on the design of a stimuli-responsive supramolecular nanostructure, composing a PS and an anticancer agent. This coassembly was also designed to display nanoscale optical properties as well as activatable singlet oxygen ($^1O_2$) generation and chemotherapeutic abilities. A superior feature of supramolecular nanostructures is the fact that they result from noncovalent interactions. Consequently, disassembly of this type of supramolecular assemblies has dynamic-controllable capabilities and can be sensitive to external stimuli. *In vivo* evaluations demonstrate that PcS-MA nanostructures have a high level of accumulation in tumor tissues, are capable of being used for cancer imaging, and have significantly improved anticancer effect compared to that of PcS. In summary, we have developed and successfully tested a facile supramolecular strategy for the design of nanostructured assembly based on photosensitizer PcS and chemotherapeutic drug MA. This study indicates a novel strategy for overcoming the limitations of photodynamic cancer therapy.

Biography

Joohee Hong was born in 1993 in Republic of Korea. She received her Bachelor's degree in chemistry from Ewha Womans University, Seoul, Korea in 2017. She is currently on MS studies under the supervision of Prof. Juyoung Yoon in the department of chemistry and nano science at Ewha Womans University. Her research interests include fluorescent chemosensors and molecular recognition..

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