Recent Progress on Activatable Photosensitizers and Fluorescent Probes

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Switchable phototheranostic nanomaterials are of particular interest for specific biosensing, high-quality imaging, and targeted therapy in the field of precision nanomedicine. Here, we develop a "one-for-all" nanomaterial (NanoPcTBs) that self-assembles from flexible and versatile phthalocyanine building blocks. Fluorescence and reactive oxygen species (ROS) generation could be triggered depending on a targeted, protein-induced, partial disassembly mechanism, which creates opportunities for low-background fluorescence imaging and activatable photodynamic therapy (PDT). We also reported a facile strategy to directly assemble a phthalocyanine photosensitizer (PcS) with an anticancer drug mitoxantrone (MA) to form uniform nanostructures (PcS-MA), which have the capability of undergoing nucleic acid-responsive disassembly. On the other hand, we demonstrated the first comprehensive molecular design of heavy-atom-free triplet PSs based on thiocarbonyl naphthalimides with excellent potential in PDT. Finally, recent progress from our group on the fluorescent probes for enzyme and HOCl will be also presented.