

A multi-step driven photothermal drug release using wire-flamed gold nanoparticles

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Here, wire-framed Au nanobundles (WNBs), which consist of randomly oriented and mutually connected Au wires to form a bundle shape, are synthesized. In contrast to conventional nanoparticles (spheres, rods, cubes, and stars), which exhibit nanostructure only on the surface, cross-sectional view image shows that WNBs have nanostructures in a whole volume. By using this specific property of WNBs, an externally controllable multistep photothermic-driven drug release (PDR) system is demonstrated for in vivo cancer treatment. In contrast to conventional nanoparticles that encapsulate a drug on their surface, WNBs preserve the drug payload in the overall inner volume, providing a drug loading capacity sufficient for cancer therapy. An improved in vivo therapeutic efficacy of PDR therapy is also demonstrated by delivering sufficient amount of drugs to the target tumor region