

Mix-charged Bionanointerface: From Smart to Self-adaptive

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The virus, which is made up of a mixed opposite charge of the different types of the amino acid, provide the best example to achieve the specific target in the complex in vivo system. In following the biological inspiration, we demonstrated that the mixed-charged of gold nanoparticle present better “stealth” properties and higher accumulation in tumor than PEG-2000 modified nanoparticles. Combing with the pH-responsive properties of weak electrolytes, the mixed charge bionanointerface can be explored as a robust method to control the aggregation of NPs sensitive to enhance the retention and cellular uptake of inorganic NPs in tumors, which has perfect stealth properties and pH-sensitivity for tumor targeting and photothermal treatment. We further demonstrate that the mixed charge gold nanoparticles present a temperature depending aggregation or dispersion behaviors, which can be further explored as a self-adaptive system to give out a constant output of temperature under near-infrared light irradiation. The output temperature is in accordance with the thermal-sensitivity difference between cancer cells and normal cells. The in vitro cell assessment confirms that the MC-GNP system could selectively kill cancer cells by forming negative feedback thermo-loop.