

Bio-formulation Engineering-Guided Design and Synthesis of Biomaterials towards Clinical Applications

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Bio-formulation engineering is a general basic scientific research direction rooted from the needs of biodrugs and biomaterials. The main research contents of bio-formulation engineering include its design principle, large-scale synthesis, and application evaluation. Generally, many biodrugs and biomaterials are unstable and can easily lose their activity during the process of preparation, storage, transportation, and use. In addition, these biodrugs and biomaterials after surface modification or functionalization usually hold different drug delivery methods and formulation. Our recent studies focused on the design and synthesis of various biodrugs and biomaterials towards clinical applications under the direction of bio-formulation engineering. For example, intravenous metal oxides with long blood circulation time acted as efficient contrast agents and ROS-response agents. Acid/enzyme resistance particles were used as oral contrast agents for gut imaging. Nanozymes after proper surface modification and self-assembly performed well in subcutaneous anti-inflammatory/anti-bacterial treatments. Light-response nanoagents with different formulations exhibited great photothermal/photodynamic effects in male sterilization and anti-tumor therapy. Taking together, bio-formulation engineering can not only highly satisfy the homogeneity, stability, and activity of various biodrugs and biomaterials towards clinical needs but also greatly enrich the structure and function information of biodrugs and biomaterials.

Key Words: Bio-formulation Engineering, Biomaterials, Toxicity, Clinical Applications

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