

Smart Nanobiomaterials for Drug Delivery and Tissue Engineering

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In our laboratory, a variety of novel nano-biomaterials, such as polymeric micelles, nanoparticles, and microparticles, have been studied for drug delivery, tissue engineering, and gene therapy. A number of biodegradable polymers and smart hydrogels containing bioactive molecules have been utilized for achieving sustained release and target-specific delivery. Self-assembled nano-scale particulates and micelles tagged with a cancer-targeting moiety on the surface were produced for actively targeting tumor cells. Recently, novel polycationic peptides and polymers were synthesized for efficient delivery of DNA into cells. We are particularly interested in self-assembled bio-mimetic nano-biomaterials useful for therapeutic and diagnostic applications. Synthetic polymers and biomolecules (peptides, proteins, and nucleic acids) have been physically and chemically hybridized to create novel functional biomaterials. In this presentation, two new target-specific strategies for delivering therapeutic anticancer agents and anti-sense oligonucleotides will be introduced. In addition, novel porous biodegradable polymer scaffolds for tissue regeneration will be discussed.