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Title: Advanced Systems for Controlled Drug Delivery from Chemically Modified Elastin-like Recombinamers

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Abstract: Targeted drug delivery is a new multidisciplinary field that aims to develop innovative nanomaterials, tools and devices to deploy a therapeutic agent to specific parts of the body where there is solely diseased tissue, thereby avoiding interaction with healthy tissue. Advanced drug-delivery systems attempt to control the site of action and release rate and act by means of either a physiological or a chemical trigger. In this sense, stimuliresponsive biomaterials are of special interest for application as components of drug-delivery devices.

This review discusses the use of elastin-like recombinamers (ELR) in drug-delivery systems. These biopolymers possess special properties that encompass biodegradability, bioactivity and stimuli-responsiveness. Their tailormade design using recombinant DNA technologies allows an absolute control of their amino acid sequence and design of the most appropriate macromolecule for each application. Firstly, devices based on monomeric elastinlike recombinamers which have been chemically modified to attach functionalities that enable us to follow or direct their distribution or anticancer drugs in an attempt to improve drug-conjugate uptake are described. Secondly, ELRs that form part of nanoparticles as drug carriers will be studied in their different versions, including nanoparticles chemically reinforced by interchain cross-linking, nanoparticles formed by self-assembly of chemically modified ELRs to achieve amphiphilic properties and multifunctional composites made up of nanoparticles coated with ELRs. Finally, recent advances in the area of 3D platforms for drug delivery, comprising interconnected hydrogels and ELR-based coacervates in the form of depots, will be reviewed.