OPEN ACCESS Freely available online

ISSN: 2167-7956
Journal of
Biomolecular Research
& Therapeutics

Commentary

Delivery of Smart Polymers in Tissue Engineering

Tang Su*

Department of BioMedicine, University of Oslo, Tokyo, Japan

DESCRIPTION

Smart polymers also known as intelligent or stimuli-responsive polymers or materials that can change their properties in response to changes in their environment. These changes can be triggered by various external stimuli, such as temperature, pH, light, magnetic fields or chemical species. The unique responsiveness of smart polymers has made them attractive for a wide range of applications, from drug delivery and tissue engineering to sensing and actuation. One of the most commonly used stimuli for triggering the response of smart polymers is temperature. Polymers that exhibit a Lower Critical Solution Temperature (LCST) undergo a reversible phase transition from a soluble state to insoluble state when the temperature exceeds a certain threshold. This behavior can be useful for various applications such as drug delivery where the polymer can release the drug payload upon reaching the target temperature of the diseased tissue. Conversely polymers that exhibit an Upper Critical Solution Temperature (UCST) undergo a phase transition from an insoluble state to a soluble state when the temperature exceeds a certain threshold.

These polymers are useful for applications such as protein separation and purification. Another common stimulus for smart polymers is pH. Polymers that undergo a pH-induced phase transition can be used for targeted drug delivery or controlled release. For example, a polymer that is soluble at neutral pH but insoluble in the acidic environment of the stomach can be used to protect a drug until it reaches. Similarly a polymer that is insoluble at neutral pH but soluble in the acidic environment of the tumor microenvironment can be used for targeted drug delivery to cancer cells.Light is another stimulus that can be used to trigger the response of smart polymers. Polymers that undergo a light-induced phase transition can be used for applications such as optical switching and optical data storage. For example, a polymer that changes its refractive index upon exposure to light can be used as an optical switch or modulator. Magnetic fields can also be used to trigger the response of smart polymers. Polymers that contain magnetic nanoparticles can be used for applications such as targeted drug delivery and tissue engineering. For example, magnetic nanoparticles can be attached to a smart polymer scaffold and used to attract and retain cells or drug molecules in a specific location under the influence of a magnetic field. Chemical species such as ions or biomolecules can also be used to trigger the response of smart polymers. For example a polymer that contains functional groups that can bind to specific biomolecules can be used as a biosensor or for targeted drug delivery. Similarly a polymer that contains functional groups that can selectively bind to metal ions can be used for applications such as water purification or heavy metal ion detection.

Smart polymers have several advantages over traditional materials, including their ability to respond to changes in their environment their ability to be designed for specific applications and their ability to be used in combination with other materials such as nanoparticles or biological molecules. They also have several challenges such as their sensitivity to external stimuli, their potential toxicity or immunogenicity and their cost and complexity of synthesis. Smart polymers have numerous applications in various fields, including biomedicine, environmental science and materials science. In biomedicine, smart polymers can be used for drug delivery, tissue engineering, biosensing and implant coatings.

Correspondence to: Tang Su, Department of BioMedicine, University of Oslo, Tokyo, Japan, E-mail: su@gmail.com

Received: 03-Apr-2023, Manuscript No. BOM-23-21240; **Editor assigned:** 06-Apr-2023, Pre QC No. BOM-23-21240(PQ); **Reviewed:** 20-Apr-2023, QC No. BOM-23-21240; **Revised:** 27-Apr-2023, Manuscript No. BOM-23-21240 (R); **Published:** 05-May-2023, DOI: 10.35248/2167-7956.23.12.287.

Citation: Su T (2023) Delivery of Smart Polymers in Tissue Engineering. J Biol Res Ther. 12:287.