

Novel Thermoresponsive Polymers

Technology Overview

Amphiphilic copolymers (i.e. polymers that contain both hydrophilic and hydrophobic components) have a vast variety of applications, such as drug delivery, tissue engineering, emulsifiers and demulsifiers. A well-known amphiphilic family of polymers is the Pluronic family[®] which have been used as stabilisers, defoaming agents, binders, and gelling agents in cosmetics, medicine agriculture, dental bleaching and the textile and food industries. However, in some cases, the gelling and rheological properties of the commercially available polymers are not optimised. Some of the polymers (Pluronic[®] family) can form non-stable gels and fail the clinical trials after body injection in the application of replacing damaged issue. A special category of amphiphilic polymers are the thermogels, which include Pluronic[®], and they are polymers whose solutions can form gels with changes in temperature. These thermogels can be used for drug delivery as injectable gels, i.e. the polymer solution is mixed with a drug at room temperature and form a hydrogel upon injection, which controls the local release of the drug. In need of new thermogels, a new novel block copolymer comprising at least three blocks using a commercial manufacturing method called Group Transfer Polymerisation (GTP) has been invented by researchers at Imperial College London. The advantage these polymers, over current commercial alternatives, is that they play a critical role in influencing the rheological and thermogelling properties of polymer solutions and the formation of gels at lower concentrations. In addition, they are potential candidates for delivery of drug for brain cancer therapy by directly injecting the hydrogel into the brain. In order to satisfy customer's need, a range of polymers could be obtained by varying the polymer characteristics independently, including: molar mass, composition and architecture.

Intellectual property information

Polymers: United States Patent Number: US 17/278771

Benefits

Novel Thermoresponsive Polymer using Group Transfer Polymerisation (GTP)

- Easy scale-up and cheap preparation method.
- Excellent rheological and thermogelling properties. Specifically, liquid at room temperature but a gel at concentrations as low as 3wt%.
- Cost-effective, low production cost, enable form gel at lower concentrations than any other synthetic polymer in the commercial market.
- “Tailored” properties: Molar mass, composition and architecture. High flexibility of changing properties to satisfy customers' need. Also easy to functionalise if needed to attach groups that will for example enhance cell adhesion.

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