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WhitePaper: Thermogels mixed Gelation morphology/speed

January 15, 2016

Purpose

To determine general thermogelation speed and morphology upon gelation of mixed AK019 and AK012 gelation system.

Materials and Methods

PLGA-PEG-PLGA LG 50:50 (w:w) (Mn ~1,000:1,000:1,000 Da) PolyVivo AK012 Lot#50904ELH

PLGA-PEG-PLGA LG 50:50 (w:w) (Mw ~1,500:1,500:1,500 Da) PolyVivo AK019 Lot#50413BAK

Methylene Blue

Hotplate

Camera

Methods

PolyVivo block copolymers catalog numbers AK019 and AK012 were both in cold water overnight to form 20% w/v solutions. A contrast dye solution was generated by dissolving methylene blue at a concentration of 2mg/ml in 0.1% acetic acid. A quantity of 0.75ml of 20% w/v AK019 solution was combined with 0.25 ml of AK012 solution and 10 μ L of 2mg/ml methylene blue was added to the solution for visibility. This solution was then pipetted onto a hot-plate and images were recorded for gelation speed.

Results/Discussion

A common question regarding thermogels is gelation speed. A large volume of thermogel solution is a relatively poor example because the 'bottle-neck' to gelation speed is how quickly the mass of water's temperature can be increased in order to effect gelation. In the sense of an injectable depot, the cold-gel solution is forced through a fine-gauge needle into a warm body. This provides a relatively high surface area for heat transfer and, in this condition, the gel reaches body temperature more rapidly than a typical in-vitro type test such as placing a glass vial full of gel in an incubator as the incubator must slowly warm the vial itself and then the contents to 37 °C to achieve gelation. As can be seen in the image below, when spread out into a fine layer more representative of actual in-vivo conditions the gel-speed is quite rapid happening in under a few seconds. A live-video of this transition can be seen online at <http://jgakinainc.blogspot.com/2016/01/mixed-thermogel-gelation-speed.html>.

