OMICS Group Conferences
Accelerating Scientific Discovery

3rd International Conference and Exhibition on
Pharmaceutics & Novel Drug Delivery Systems
April 08-10, 2013 Hilton Chicago/Northbrook, USA

Swelling properties of poly (vinyl alcohol) cryogels

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Utilizing single or multiple freezing/thawing cycles, poly(vinyl alcohol) solutions can be transformed into cryogel. Such cryogels, depending on process conditions and PVOH characteristics, possess different crystal structures, and hence interact differently in an aqueous medium. Such unique material-property relationship can be utilized in controlled release applications. In this study, we utilized 3, 5, 8, and 10wt% PVOH solutions (MW>120K), and prepared their corresponding hydrogels following two cycles of freezing (4hr @ -10°C) and thawing (2hr @ 25°C). Prepared cryogels were subjected to gravimetric swelling study (1g in 50mL distilled water) at 25°C. The amount of water absorbed into cryogel structure was measured after 0.5, 1, 2, 4, 8, 12, and 24hr retention in the swelling medium. Cryogels prepared at different solution concentrations absorbed 16, 36, 41, and 51% water over 24 hr swelling period. Although low polymer cryogels reached to their maximum swelling capacity faster, high polymer cryogels provided higher swelling capacity over a 24hr period. When swelling capacity was plotted versus time1/2, we found that a diffusion-controlled swelling is predominant for high polymer cryogels. According to this swelling data, low and high polymer cryogels can provide different drug release mechanisms if such cryogels are used as a controlled release medium.

Biography

Srinath has B.S. in pharmacy from Andhra University (India, 2008), and M.S. in pharmaceutical science from Campbell University (USA, 2010). Srinath is a 2nd year Ph.D. student, developing abuse-resistant pharmaceutical dosage forms.

David Mastropietro received his B.S. in Pharmacy from Massachusetts College of Pharmacy in 1999. He is completing his Ph.D. in Pharmaceutics at Nova Southeastern University (NSU) with dissertation work focused on abuse-deterrent dosage-forms. Hossein Omidian has a M.Sc. in Chemical Engineering and a Ph.D. in Polymer Science. He is currently an Associate Professor at NSU where David and Srinath are both part of his research group.

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