142an Synthesis and Characterization of pH-Sensitive Poly(Ethylene Glycol) -Rich Full Interpenetrated Polymer Networks for Controlled Drug Delivery

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Interpenetrated polymer networks (IPN's) are complex combinations of at least two crosslinked polymers held together by permanent interlocking of the chains through chemical crosslink's of each polymer. The networks were tailored with methacrylic acid (MAA) and poly(ethylene glycol) 1000 monomehtyl ether monomethacrylate (PEG) as monomers and poly(ethylene glycol) 200 and 1000 dimethacrylate (PEGDMA) and Florescein dimethacrylate as crosslinking agents. Various IPN's morphologies were investigated including MAA as the primary network and PEG as the secondary network and vice versa. IPN's were tailored to contain MAA in order to produce environment sensitive polymeric networks which are excellent candidates for targeted drug delivery applications. More specifically, the protonated acid of MAA and the ether group of PEG form interpolymer complexes that tend to colapse at low pH and swell at higher pH environments. The PEG was selected because of its non-immunogenic properties and recent studies show enhancement in the transport of multi-drug resistance associated protein (MRP) and multi-drug resistance substrates (MDR). Characterization of these matrices included visualization by Confocal Laser Scanning Microscope (CLSM) of fluorescent IPN's and equilibrium swelling behavior. The incorporation of MAA provided some PH sensitivity, but to a lesser extent than the MAA hydrogels. Likewise the interpenetration of PEG provoked a reduction in swelling behaviour when compared to its homopolymer counterpart. Further characterizations of the IPN's through CLSM indicated that homogeneous physical interpenetration has occurred for both IPN structures. Preliminary scanning electron microscopy (SEM) results provided further indication of physical interpenetration of the networks.