

Nuorn Choothong 2012: Preparation of Amphiphilic Polymer from Chemical Modification of Poly (γ -Glutamic Acid) (γ -PGA) for Use as a Sensing Material. Master of Engineering (Materials Engineering), Major Field: Materials Engineering, Department of Materials Engineering. Thesis Advisor: Miss Amornrat Lertworasirikul, D.Eng. 106 pages.

The aim of this research is to prepare sensitive and selective sensing materials based on poly (γ -glutamic acid), γ -PGA. Hydrophobic moieties, i.e. L-phenylalanine (L-PAE) and benzoxazine monomers (Bxs) were grafted onto γ -PGA. γ -PGA-*graft*-L-PAE having grafting degree of 30-50% showed thermoresponsive properties. The grafting degree of γ -PGA-*graft*-L-PAE had effect on thermoresponsive behavior. In aqueous solution, the copolymers with grafting degree about 49% showed thermoresponsive phenomenon at 80°C while the copolymers with grafting degree in range of 30-36% showed thermoresponsive properties when NaCl was added. Polymer concentration and polarity of solvent had effect on the thermoresponsive behavior. The clouding temperatures decreased as polymer concentration and NaCl concentration increased. The thermoresponsive phenomenon was reversible. Poly (γ -glutamic acid)-*graft*-3,4-dihydro-3-(2'-ethylhydroxyl)-6-methyl-1,3,2H-benzoxazine (γ -PGA-*graft*-Mt-Bx) and poly (γ -glutamic acid)-*graft*-3,4-dihydro-3-(2'-ethyl hydroxyl)-6-ethyl-1,3,2H-benzoxazine (γ -PGA-*graft*-Et-Bx) were prepared by esterification reaction. The most attainable degree of conversion of γ -PGA-*graft*-Mt-Bx and γ -PGA-*graft*-Et-Bx were 30% and 25%, respectively. These grafted copolymers showed a highly selective and sensitive recognition toward Cu (II) and Fe (III) ions in both aqueous and DMSO solutions. Dual responses, i.e. changes in color and solubility properties were observed in aqueous solution when the copolymers formed complexes with Cu (II) and Fe (III) ions. γ -PGA-*graft*-Mt-Bx showed higher adsorption efficiency than γ -PGA-*graft*-Et-Bx.

Student's signature

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