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INFLUENCE OF GRAFTED FUNCTIONAL THERMO-RESPONSIVE TERPOLYMER ON THE ENVIRONMENTAL BEHAVIOR OF PHOTO-CROSS-LINKED SOLKETAL ACRYLATE GEL THIN FILMS: A COMPREHENSIVE STUDY BY SURFACE PLASMON RESONANCE

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The present study has been achieved in three stages. The first stage involves the preparation of three acrylate monomer, the first one is 2, 2-dimethyl-1,3-dioxoylan -4-yl-methylacrylate (Solketal acrylate) (SKA) and was prepared in two steps. The other two monomers acts as functional and hydrophobic, 4-acetylphenyl acrylate (APA), and 4-formyl-2-methoxyphenylacrylate (VA) which prepared from vanillin; both prepared in one step reaction. All monomers were evaluated and characterized by 1H, 13C and FTIR demonstrated good agreement with their chemical structures.in the next stage, two kinds of polymers have been fabricated. The copolymerization of SKA with a different molar concentration of photo-cross-linker producing poly (SKA-co-DMIAAm) which act as a hydrophobic copolymer, while the copolymerization between N-isopropylacrylamide with a different molar concentration of VA and APA for producing thermo-responsive bi-functional polymer. They have been done by free radical polymerization in solution and AIBN as initiator. The overall polymers have been chemically (1HNMR, FTIR) and physically (GPC, DSC) investigated and characterized. The lower critical solution temperature of thermo-responsive polymers has been measured using UV-vis spectroscopy. The final stage is the formation of gel thin films by deposition of photo-cross-linked polymer over gold thin film with adhesion promoter then cross-linked by UV irradiation. The SKA was exposed to surface chemical reaction and converted to a hydrophilic surface by ring opening and presence of hydroxyl group. An additional layer of thermo-responsive functional polymer thin film was achieved. The swelling of each layer was measured using surface plasmon resonance with an optical waveguide. The aim of the study is the formation of gel multi-layer with a hydrophobic and hydrophilic character with a thermo-responsive upper layer and a non-responsive lower layer which facilitate the formation of gel vessel for targeting biomolecules.

Biography

Momen S A Abdelaty is an Assistant Professor at Chemistry department, Faculty of Science at Al-Azhar University. He has finished his Bachelor in General Chemistry from Al-Azhar University. His Master thesis on polymer chemistry has been finished at Chemistry department, Faculty of Science, Al-Azhar University. He has granted PhD scholarship in the University of Paderborn Germany in 2008-2012 with the group of Professor Dr Dirk Kuckling. The project title was photo-cross-linked polymers and hydrogel thin film. After that, he has followed Postdoc Scholarship with the same group. Till now he is working as an Assistant Professor in Polymer Chemistry at Chemistry department, Faculty of Science, Al-Azhar University. He joined as an Associate Professor at University of Tabuk, Kingdom of Saudi Arabia.

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