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Hydrogels based on maleoyl-chitosan and poly (acrylic acid) functionalized with arginine with potential application as wound dressings

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Over the last decade, hydrogels have received a considerable attention due to their resemblance to the natural extracellular matrix providing soft tissue-like environment for cell proliferation and survival while allowing diffusion of nutrients and other water-soluble metabolites through the hydrogel network. Moreover, they have advantages over other types of polymeric scaffolds such as biocompatibility, easy control over structural parameters, high water content and tunable scaffold architecture. A variety of synthetic or natural polymeric hydrogels have been employed as scaffolds in tissue engineering applications among them chitosan, a biopolymeralso frequently used for pharmaceutical and biomedical applications. Moreover, chemical functionalization of the hydrogels with bioactive compounds has been widely used to control the interactions between cells and materials, emerging as an important strategy for developing new hydrogels. Based on these observations, L-arginine, an α-amino acid with remarkable biological properties in wound healing was chosen to graft onto hydrogels based on N-maleoyl-chitosan and poly (acrylic acid) in order to modulate the physico-chemical properties and specific cellular responses.The morphological structure of these hydrogels was investigated by SEM images and its degradation performance was tested. The swelling behavior in simulated exudate fluid demonstrated an increased capacity of absorbing fluids while the maximum swelling ratio was achieved in less than 1 minute. Also, the hydrogels cyto compatibility on fibroblast was assessed, revealing cyto compatible characteristics by comparison to control. These results indicated that the grafting of arginine could lead to new type of biologically active biomaterials with potential use as wound dressings.

Biography

Alina Gabriela Rusu is a PhD student in Chemistry from Technical University "Gheorghe Asachi" of Iasi, Faculty of Chemical Engineering and Environmental Protection and Member in the Center for Training and Research in Tissue Engineering and Regenerative Medicine from University of Medicine and Pharmacy "Grigore T. Popa" of Iasi. In December 2014, she obtained a Doctoral Scholarship in the POSDRU Program159/1.5/S/133652 at "Alexandru Ioan Cuza" University of Iasi. She completed her MSc degree in Prosthetics Bioengineering in 2012. Her research studies are focused on developing and characterization of novel scaffolds based on functionalized chitosan with potential applications in medicine.

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