

Accepted Manuscript

Title: Synthesis of [Please check the DOC headfor correctness.](#) hybrid materials using graft copolymerization on non-cellulosic polysaccharides via homogenous ATRP

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PII: S0079-6700(17)30025-4
DOI: <http://dx.doi.org/doi:10.1016/j.progpolymsci.2017.07.006>
Reference: JPPS 1038

To appear in: *Progress in Polymer Science*

Received date: 20-1-2017
Revised date: 2-4-2017
Accepted date: 18-7-2017

Please cite this article as: Seidi Farzad, Salimi Hamid, Shamsabadi Ahmad Arabi, Shabanian Meisam. Synthesis of hybrid materials using graft copolymerization on non-cellulosic polysaccharides via homogenous ATRP. *Progress in Polymer Science* <http://dx.doi.org/10.1016/j.progpolymsci.2017.07.006>

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Synthesis of hybrid materials using graft copolymerization on non-cellulosic polysaccharides via homogenous ATRP

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Abstract

Inclusion of various polymeric chains with different lengths and functionalities (such as hydrophobic, ionic, acidic, basic, etc) into polysaccharide backbones leads to new polymeric materials with interesting properties that may self-assembled into different aggregations and have the potential to for use in a variety of applications. This review highlights the application of various ATRP techniques (such as “grafting-from” and “grafting-to”) to modify non-cellulosic polysaccharides under homogenous condition. Chemical modification of chitosan, pullulan, dextran, agarose, hyaluronic acid (hyaluronan), starch, glycogen, heparin, chitin, guar gum, locust bean gum, and dextrin using ATRP are described. Pre-functionalization or protection of some functional groups in the polysaccharide backbone required in some cases to prepare a precursor with higher solubility in organic solvents is illustrated. For each polymerization, the strategy for synthesis of the copolymer and the condition of the polymerization is described in detail along with the properties of the prepared copolymers. Furthermore, examples that produced materials with the potential for use in a specific application are reviewed in summary.

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|----------------------|---|-----------|--|
| Abbreviations | AAP 4-aminoantipyrine | PDEAEMA | poly(2-(N,N-diethylamino)ethyl methacrylate) |
| AGET | activators generated by electron transfer | PDEGCholA | poly(diethylene glycol) |

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