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POSTER PROGRAMME

Grafting of Functional Brushes on the Surface of 5-Fluorouracil Molecularly Imprinted Polymer Particles through RAFT Polymerization

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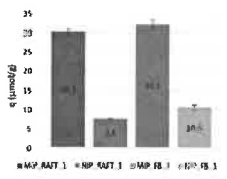
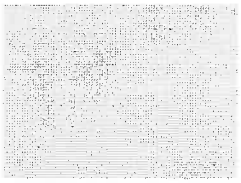
The grafting of functional brushes on the surface of molecularly imprinted polymer (MIP) particles has been explored in the last few years to synthesize materials combining high molecular recognition capabilities and stimulation triggered by changes in the surrounding environment [1,2]. In the present work, MIP particles for 5-fluorouracil (a drug used in cancer treatment) were produced by precipitation polymerization in acetonitrile, using either MAA or HEMA as imprinting functional monomers, and in the presence of different kinds of RAFT agents. In a second step, taking advantage of the RAFT groups present in the surface of the particles, different kinds of functional polymer brushes were grafted on the MIPs considering a ''grafting from'' process in the presence of a RAFT agent. Introduction of pH-sensitive functional polymer brushes was carried out using again MAA and HEMA in this second stage, whereas temperature-sensitive MIP particles were sought by using NIPA to create the functional brushes (FB). The size of the functional polymer brushes grafted on the particles surface was measured through the SEC analysis of the free polymer formed on the second reaction step. A general kinetic modeling approach [3] was used to aid in the design of operation conditions leading to imprinting polymer networks with tailored properties and functional brushes with controlled size. Through comparative drug sorption measurements in imprinted/non-imprinted materials, it is shown that it is possible to achieve a good imprinting efficiency of 5FU (Figure 1). Moreover, comparison of drug release in particles with/without functional brushes allows to conclude that improved sensitivity to surrounding conditions is introduced in the grafted products.

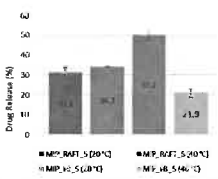
Indeed, change of 5FU release in acidic/alkaline (pH=2/10) conditions is possible for MIP particles with MAA or HEMA FB (Figure 2) and temperature dependent (T=20/40 °C) drug release is observed in products bearing NIPA grafted functional brushes (Figure 3).



(1) Molecular imprinting of 5FU



(2) Effect of pH on drug release



(3) Effect of temperature on drug release

References:
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