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# Synthesis and characterization of a system based on magnetic nanoparticles with molecularly imprinted polymers and its evaluation in drug release

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**Statement of the Problem:** Cancer is an illness present in the whole world, only in 2015, it registered 8,8 million people died because of this disease. Nowadays the chemotherapeutic remains like the most popular treatment. However, it is not selective and usually, bring with its multifold side effects which decrease the patient's quality of life. For this reason, is searched to develop drug delivery systems which let the drug release in the target site decreasing in this form dose and side effects. One of the most promising drug delivery systems are the systems based on the hybrid of molecularly imprinted polymers (MIP´s) with magnetic nanoparticles as magnetite ($Fe_3O_4$). The magnetic molecularly imprinted polymers (MMIP´s) combine the magnetic properties from nanoparticles with the high capacity of recognize from MIP´s in an only hybrid structure functional which let to obtain a system whose drug delivery is only in the target site improving the drug efficiency and resulting in a reduction of the side effects on normal tissues. In this work is presented the synthesis and characterization of a magnetic MIP system for the selective recognition of the antitumoral drug 6-mercaptopurine and its evaluation as a drug delivery system.

**Methodology:** The synthesis of magnetite nanoparticles has been carried out by the coprecipitation method. The particles were coated with the polymer by non-covalent molecularly imprinted technique, four different functional monomers were evaluated. The systems were characterized and carried it out the adsorption studies. Finally, the *in vitro* release of 6-mercaptopurine was studied evaluating the effect of the magnetic hyperthermia with alternating magnetic field.

**Conclusion:** The magnetic nanoparticles were successfully coated with different polymers. Differences in the amount of drug adsorbed were observed in the different systems showing all these Isotherms like Langmuir-Freundlich. The evaluation of drug release showed differences when the systems were exposed under an alternate magnetic field.

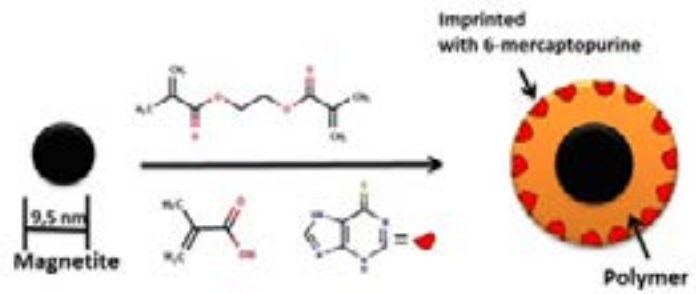


**Figure 1.** Imprinting process on the magnetic nanoparticles.

**Recent Publications**

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3. Yin, Q., Shen, J., Zhang, Z., Yu, H. & Li, Y. Reversal of multidrug resistance by stimuli-responsive drug delivery systems for therapy of tumor. Adv. Drug Deliv. Rev 65, 1699-1715, doi:https://doi.org/10.1016/j.addr.2013.04.011 (2013).
4. Kubo, T. *et al.* Magnetic Field Stimuli-Sensitive Drug Release Using a Magnetic Thermal Seed Coated with Thermal-Responsive Molecularly Imprinted Polymer. ACS Biomaterials Science and Engineering 5, 759-767, doi:10.1021/acsbiomaterials.8b01401 (2019).
5. Dinc, M., Esen, C. & Mizaikoff, B. Recent advances on core–shell magnetic molecularly imprinted polymers for biomacromolecules. TrAC - Trends in Analytical Chemistry 114, 202-217, doi:10.1016/j.trac.2019.03.008 (2019).

**Biography**

Leticia Antonio is a student of the master's in chemicals sciences of the National Autonomous University of Mexico, UNAM. Her investigation project is focused on the study of magnetic molecularly imprinted polymers as a drug delivery system for the treatment of cancer. In order to improve the efficiency in the coating, she is evaluating a new method of synthesis using the magnetic hyperthermia.

**Notes:**