

## **Esterification influency in thermosensitive behavior of copolymers PNIPAM-co-PAA and PVCL-co-PAA**

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The ability to generate heat from magnetic nanoparticle and the response of thermosensitive polymers poly(n-isopropylacrylamide) (PNIPAM) and poly(n-vinyl caprolactam) (PVCL) are sources that have promoted several studies in controlled drug release systems.<sup>1</sup> As the lower critical solution temperatures (LCST) of PNIPAM and PVCL are between 32-35 °C and approach the temperature of the human body enabling biomedical applications.<sup>2</sup> Polymers that have greater interaction with water increase the LCST so poly(acrylic acid) (PAA) was studied copolymerized with PNIPAM in aqueous solution.<sup>3</sup> However, polymers composed only of PNIPAM and PAA applied in drug delivery are limited to loading only hydrophilic drugs. Cancer treatment is possible combining magnetic hyperthermia and thermosensitivity polymers by using an alternated magnetic field to heat the polymer in the surface of a magnetic nanoparticle.<sup>1</sup> The heat produced from magnetic nanoparticles shrinks PNIPAM and PVCL structure and release water and a drug (methotrexate) that interacts with the polymer chain.<sup>4</sup> In this work magnetite nanoparticles was surface modified with a copolymer of n-isopropylacrylamide or n-vinylcaprolactone and acrylic acid (AA) by an esterification synthesis method. Infrared spectroscopy indicate the presence of the polymer in the magnetic nanoparticles and showed the bound of carboxylic groups to the magnetite surface. The hyperthermia experiment showed that polymeric nanoparticles can heat from 25 °C to 43 °C in less than 3 minutes. The polymeric magnetic nanoparticle has a high release rate of methotrexate in 43 °C, but low in 37 °C. PNIPAM or PVCL and PAA showed different results in methotrexate release, as the esterificated copolymer of PNIPAM showed an increase in MTX release in 43 °C and PVCL esterificated decrease the release rate. The LCST of PINIPAM and PVCL decreased with the esterification and it is an expected outcome since the reaction added hydrophilic groups in the polymer chain.

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