

Preparation of Thermally Sensitive Latex Particles and their Utilization in Biomedical Field

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Due to their outstanding properties explored in numerous applications such as waste water purification, biomedical area, an increasing attractive interest has been dedicated to the elaboration of divers thermally sensitive hydrogel particles. Such stimuli-responsive latexes prepared by radical precipitation polymerization process of alkylacrylamide (or alkylmethacrylamide) derivatives exhibit a well-defined and reversible volume phase temperature (T_{VPT}) comparable to the low critical solubility temperature (LCST) of the corresponding soluble homopolymer. In this field, much work has been reported on the preparation and characterization of poly(N-isopropylacrylamide)-based hydrogel particles as can be evidenced by the numerous papers published last decade. With regards to the practical points of view, only few works have been devoted to the utilization of such polymer particles in biomedical field (i.e, medicine and diagnostic) as a polymer support or a carrier of biomolecules and drugs.

One of the main objective of our research is devoted to the preparation and colloidal characterization of poly(alkylacrylamide)-based hydrogel particles (i.e. poly(N-isopropylacrylamide) and poly(N-isopropylmethacrylamide)) bearing reactive groups (i.e. amine, carboxylic, aldehyde, thiol) induced by using appropriate functional monomers. The functional monomers used in batch preparation recipe were found to affect the polymerization process (i.e. polymerization rate, water soluble polymer formation and particle size) and control the colloidal properties of the final microgel particles (i.e. colloidal stability, charge density and swelling ability as a function of pH, salinity and temperature). One important feature of such thermally sensitive particles is that the adsorption, the desorption and the covalent binding of proteins, antibodies and nucleic acids are drastically affected by the temperature which controls the surface properties of such polymer support.

The aim of this work is to report first a brief vision on the preparation and colloidal characterization of functionalized thermally sensitive microgel latexes using precipitation polymerization process and various reactive monomers. Secondly, the immobilization behavior of proteins and nucleic acids as a function of experimental conditions (pH, salinity, temperature) will be presented together with some possible application of such stimuli-responsive microgel particles in biomedical diagnostic field.