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Design of core-shell magnetic nanocomposite by using linear and branched polycation as an ad-layer: Influences of the structural and viscoelastic properties

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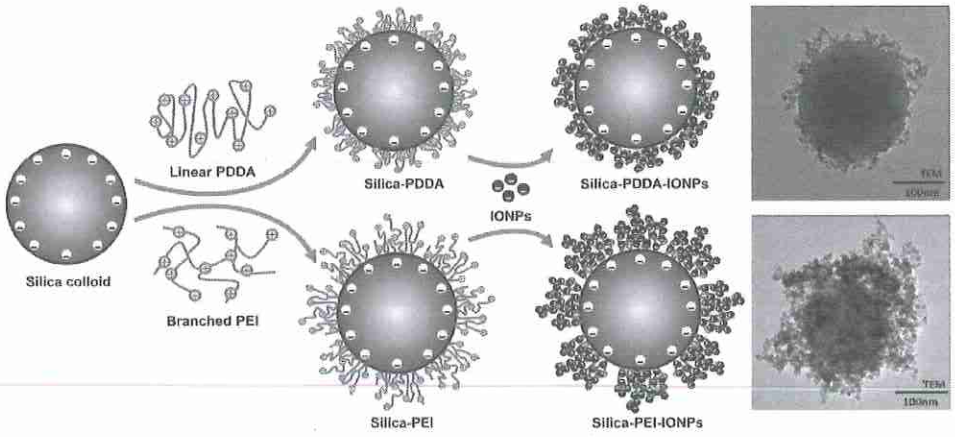
GRAPHICAL ABSTRACT



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ABSTRACT

We outlined in this study the assembly of polyelectrolyte layers and its impact toward the immobilization of iron oxide nanoparticles (IONPs) onto silica colloid. The deposition kinetic of IONPs was investigated by the dynamic light scattering (DLS) and quartz crystal microbalance with dissipation (QCM-D) techniques. The structural properties of nanocomposite formed was examined by transmission electron microscope (TEM) and atomic force microscopy (AFM) to ascertain the development of core-shell morphology. From our results, polyelectrolyte layer constructed by branched poly(ethyleneimine) (PEI) was in more extended form compared to the linear PEI and poly(diallydimethylammonium) choride (PDDA). The layer thickness obtained for adsorbed polyelectrolyte was analyzed by both mean field and scaling approaches. From these analyses, it was found that the IONPs deposited onto the more stratified PEI polymeric network occurred at higher rate compared to PDDA layer. To demonstrate the potential application of this structure, the nanocomposite with different polyelectrolyte architecture was tested on dye removal by taking two different types of dye as the model system, namely cationic

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