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Synthesis of polyethyleneimine-modified magnetic iron oxide nanoparticles without adding base and other additives

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Abstract

A simple method of preparing PEI-modified magnetic iron oxide nanoparticles ($\text{Fe}_{3-x}\text{O}_4@PEI$) in one-step without adding base and other additives has been developed in order that pre-modified PEI molecules containing alkaline sensitive bonds can directly be used. In this method, polyethyleneimine (PEI) was selected as base as well as stabilizer and high pH value media was avoided. Different with other co-precipitation processes, $\text{Fe}^{2+}/\text{Fe}^{3+}$ 5 and N/Fe 4 were proved to be the optimal conditions. The synthesized product was confirmed to be $\text{Fe}_{3-x}\text{O}_4@PEI$ with small crystallite size and good magnetic property, and proved to be stable at pH3-pH10. This report provides an easy way in preparation of modified magnetic iron oxide nanoparticles using polymers containing alkaline sensitive bonds.

Keywords: magnetic materials, nanoparticles, polyethyleneimine, biomaterials, pH-stability

1. Introduction

Magnetite is the only magnetic materials that are approved by U. S. Food and Drug Administration (FDA) for use in human so far [1]. Synthesis of magnetite nanoparticles is of great interest for researchers in

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