

Novel magnetic Fe₃O₄ nanoparticle for phosphate removal and recovery

Introduction

The use of nanoparticles (NPs) as inorganic filler to enhance membrane performances, in term of mechanical properties and thermal stability, is widely investigated in literature. Among NPs, recently Fe₃O₄ have gained an high interest in the matrix mixed membrane field due to its magnetic properties and its ability to be easily functionalized for the detection of specific molecules, ions and compounds [1]. The addition of functionalized Fe₃O₄-NPs in the membrane has an important potential both for the improving of membrane stability and to increase its affinity for the removal of target ions.

Aim of the project

The purpose of this project is to synthetize and functionalize Fe₃O₄-NPs able to selective capture phosphate ions. Fe₃O₄-NPs can be functionalized with urea-type receptors, known in literature to be selective for phosphate [2]. The properties of the NPs will be investigated in term of morphology, chemical structure and size distribution. Once functionalized, the Fe₃O₄-NPs tested in term of phosphate removal at different adsorbed and .

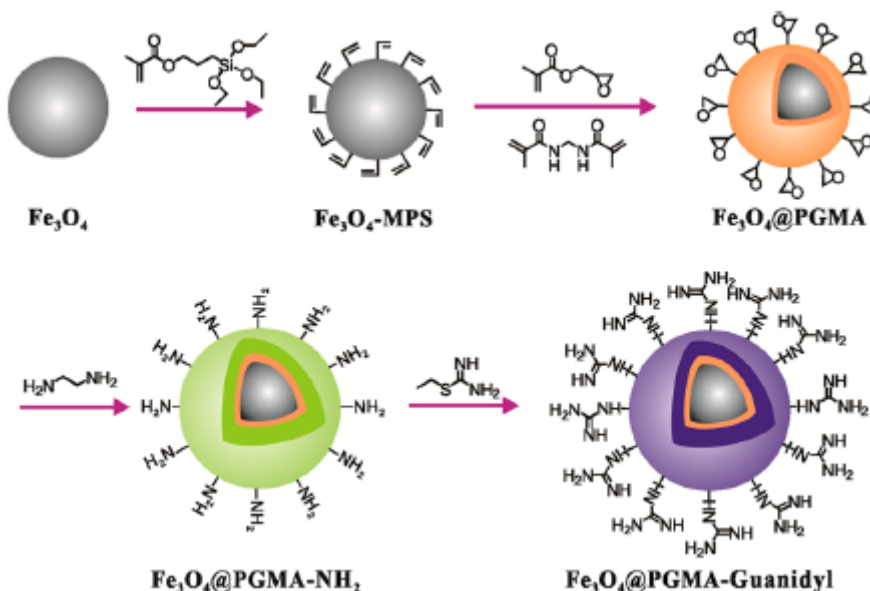


Fig.1. Schematic illustration of synthetic procedure for Fe₃O₄-NPs with urea-type group. [3]

Project planning:

- Literature research: strategic synthesis of Fe₂O₄ nanoparticles; functionalization method for Fe₂O₄; Experimental phase:
 1. Synthesis of NPs and functionalization with urea-type molecules;
 2. Characterization of NPs and preliminary study on P-selectivity performances;
- Thesis writing

1) N. Ghaemi, Chemical Eng. J., 2015, 263, 101-112
 2) Blondeau P., Chem Soc. Rev. 2007, 198-210
 3) Z. Xiong, Appl. Mater. Interfaces, 2014, 6, 22743-22750