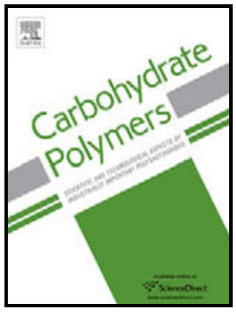

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Investigations of benzo[a]pyrene encapsulation and Fenton degradation by starch nanoparticles

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Highlights

- **A production of modified starch nanoparticles were obtained by dialysis.**
- **The formation of hydrophobic microdomains was investigated by several techniques.**
- **The Critical aggregation concentration was evaluated by fluorescence spectroscopy and DOSY NMR experiment.**
- **OSA-BS-starch increased 2.5-fold the BaP degradation by Fenton oxidation process.**

ABSTRACT

Starch nanoparticles were produced by dialysis method from octenyl succinic anhydre (OSA) and 1,4-butane sultone (BS). The properties of the self-assembled nanoparticles were characterized by NMR spectroscopy (DOSY), fluorescence spectroscopy and dynamic light scattering (DLS). In order to investigate the formation of hydrophobic microdomains, the Nile Red dye was used as a fluorescent probe to evaluate the critical aggregation concentration (CAC) of modified starch in aqueous solution. The results show that the entrapment of the molecular guest was effective and only restricted by the solubility limit of the starch. Then, the modified starch was applied to solubilize benzo[a]pyrene (BaP) in view of degradation by Fenton process. Finally, it has been shown that 95% of BaP was degraded when it was encapsulated in OSA-BS-starch nanoparticles.

***Keywords**:* starch, nanospheres, dialysis, benzo[a]pyrene, fluorescence, DOSY NMR.

1. Introduction

It is well known that starch is one of the most abundant natural and biodegradable polymer. This plant biomass material is the raw materials of many industrial applications under native or modified