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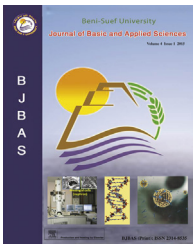

Full Length Article

Control of colloidal $CaCO_3$ suspension by using biodegradable polymers during fabrication

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ABSTRACT

Fabrication of homogenous $CaCO_3$ particles is a significant step in assembling polyelectrolyte capsules. It is crucial to control the dimensions, the shape and the charge of the calcium carbonate particles in order to have homogenously separated and charged templates as final result. For this reason, previously. hey have been deeply investigated.

Recently, crystallization of $CaCO_3$ was done by adding poly (sodium 4-styrenesulfonate) (PSS) as negatively charged polymer and poly (allylamine hydrochloride) (PAH) as positively charged polymer and the results were surprising. The homogenous particles were separated and they carried the same charge of the used polymer.

The aim of this work was to investigate the synthesis process of $CaCO_3$ particles in different experimental conditions: calcium carbonate was produced in presence and in absence of water and with addition of appropriate polymers. In particular, chitosan (CHI) and poly acrylic acid (PAA) were chosen as biodegradable polymers whereas PSS and PAH were chosen as non-biodegradable polymers. Shape and diameter of particles were investigated by using transmission and scanning electron microscopy, elemental composition was inferred by energy dispersive X-ray analyses whereas their charges were explored by using zeta potential.

1. Introduction

Synthesis of $CaCO_3$ has been an attractive issue since many years (Ogino et al., 1987; Spanos and Koutsoukos, 1998; Koga et al., 1998; Tracy et al., 1998; Horn and Rieger, 2001; Kitamura 2001; Kitamura et al., 2002) because it provides an excellent template for encapsulation of cargo molecules either by using co-precipitation in its porous (Fig. 1, Scheme 1, pre loading method) (Volodkin et al., 2004) or by loading cargo molecule after core removal (Fig. 1, Scheme 2, post loading method) (Sukhorukov et al., 2001). Furthermore, it is not toxic and can be easily and gently removed by complexation with

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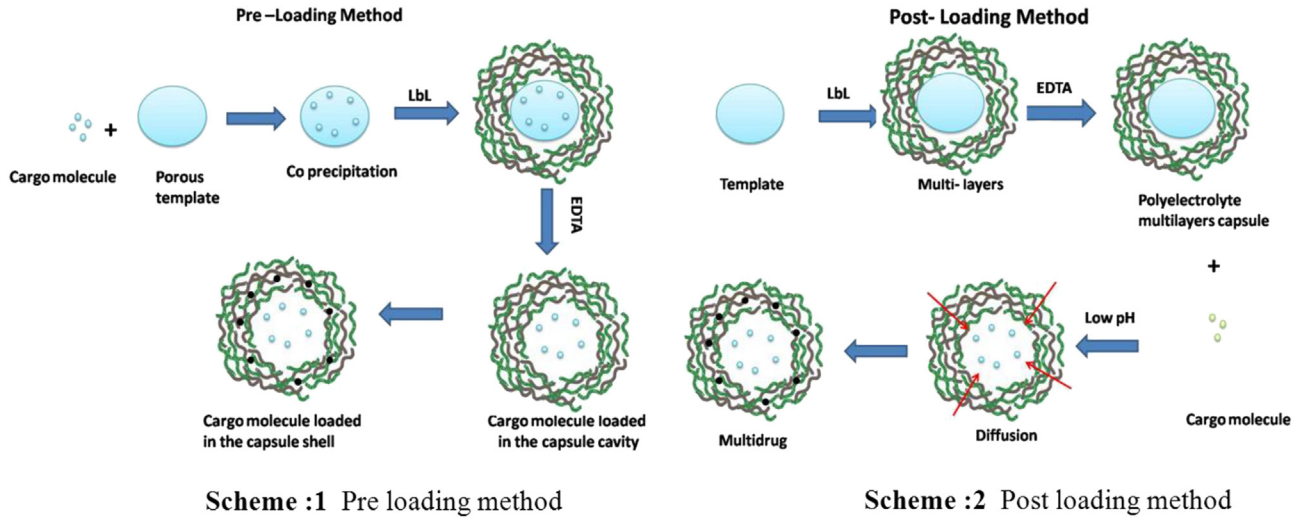

Fig. 1 – Schemes for drug encapsulation.

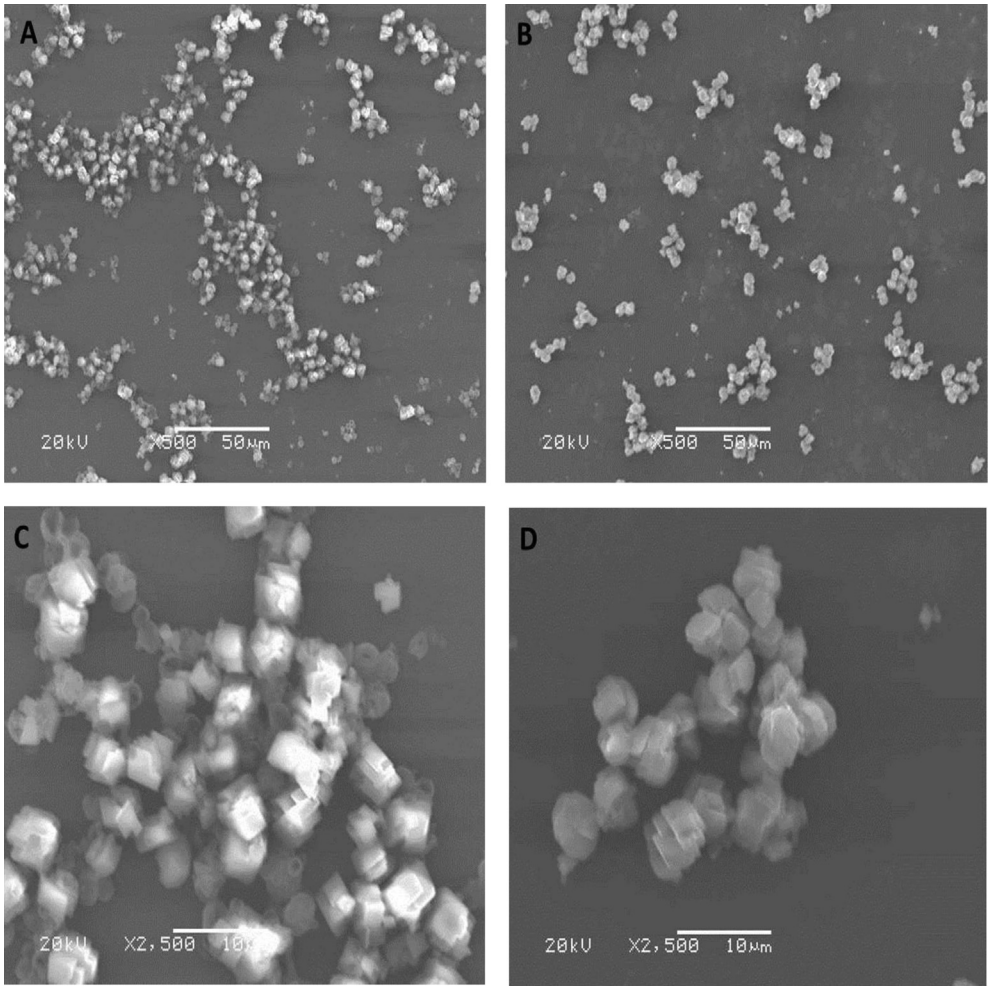

Fig. 2 – SEM images of $CaCO_3$ particles fabricated in absence (A and C) and in presence of distilled water (B and D). The high magnification (2.500X) shows aggregated particles in both samples (C and D).