ENCAPSULATION OF EUGENOL AND THYME ESSENTIAL OIL IN STARCH SODIUM OCTENYLSUCCINATE

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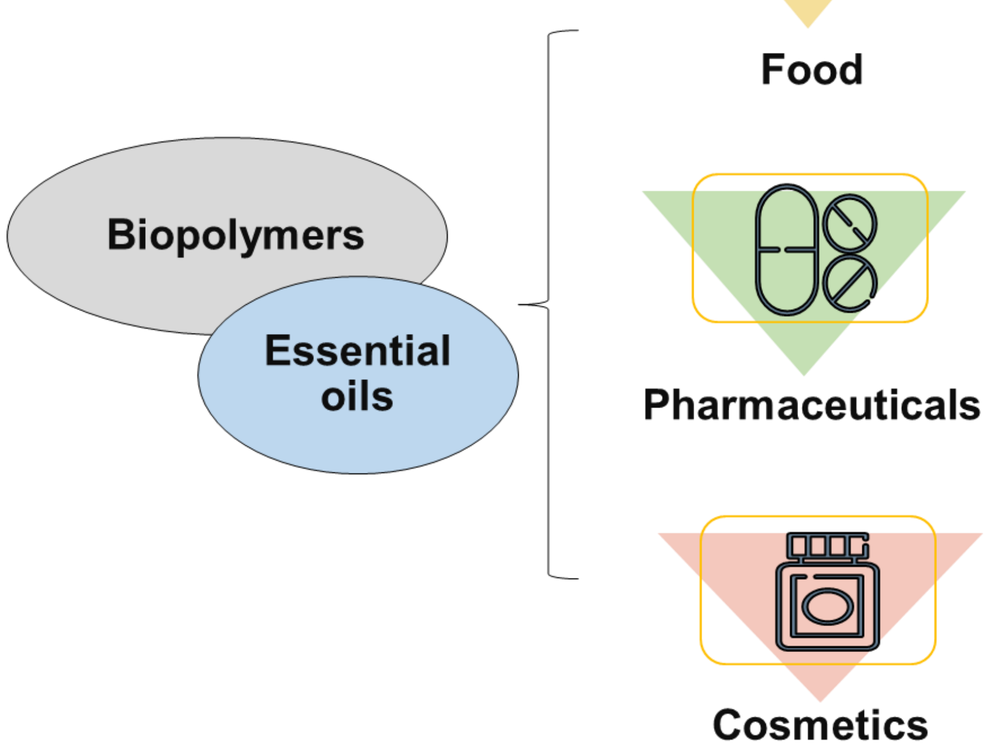
The aim of study is the preservation of the active properties of essential oils by encapsulation them in starch sodium octenylsuccinate (OSA). Several encapsulation techniques were chosen for eugenol (EU) and thyme essential oil (TH) encapsulation: emulsions containing OSA and EU or TH were prepared; nano spray drying of emulsions was performed. Firstly, emulsions containing 20% of OSA and 10% of EU or TH were obtained by using high-shear homogenisator. Afterwards, EU or TH were encapsulated in OSA by using nano spray dryer. The obtained OSA-EU and OSA-TH capsules were characterized by scanning electron microscopy (SEM), Fourier transform infrared spectroscopy (FT-IR) and thermogravimetric analysis (TA).



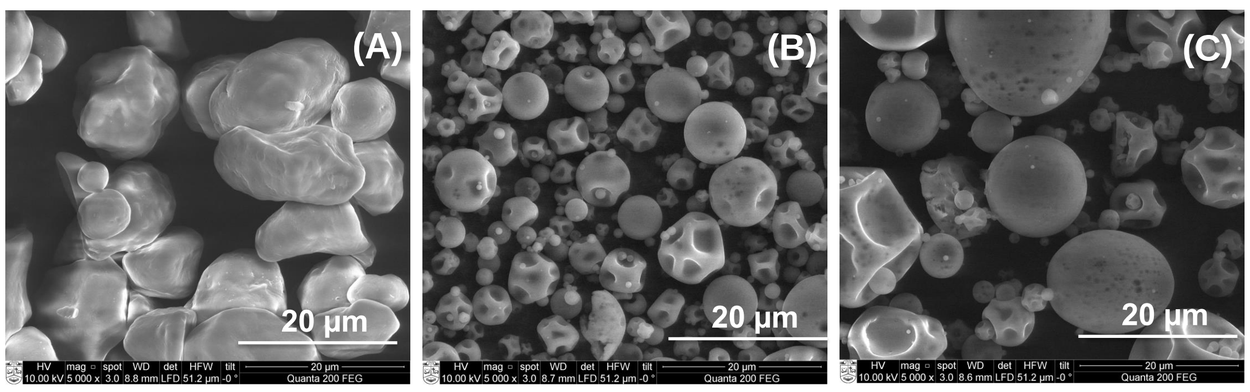


Fig. 1. SEM micrographs of OSA (A), OSA-EU (B) and OSA-TH (C) samples. The magnification is ×5000

Sample	Initial temperature of thermal decompose	Carbonaceous residual at 590℃
OSA	T_1 = 282℃	14.4%
OSA–EU	T_1 = 244℃	12.4%
	T_2 = 291℃	
OSA–TH	T_1 = 230℃	9.6%
	T_2 = 252℃	
	T_3 = 286℃	

Table. 1 Thermogravimetric analysis results of OSA, OSA-EU, OSA-TH samples

According to SEM and TA results, the diameter of obtained capsules was approx. from 0.5 to 1 µm and the thermal stability of capsules containing eugenol was higher, respectively (Fig 1, Table 1). The FT-IR spectra of OSA-EU and OSA-TH show the main characteristic peaks of individual components (Fig. 2). The release studies of EU and TH from capsules into ethanol were performed (Fig. 3) and the antioxidant activity of capsules was determined (Fig. 4).

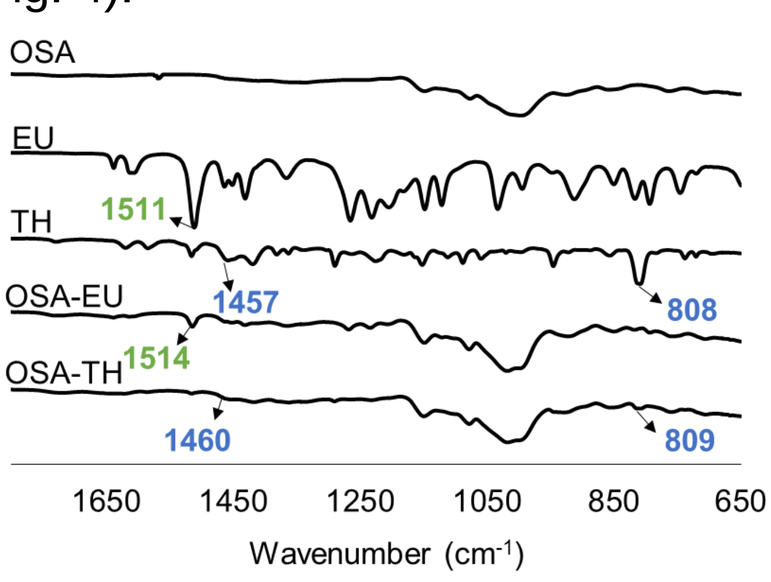


Fig. 2. FT-IR spectra of OSA, EU, TH, OSA-EU and OSA-TH

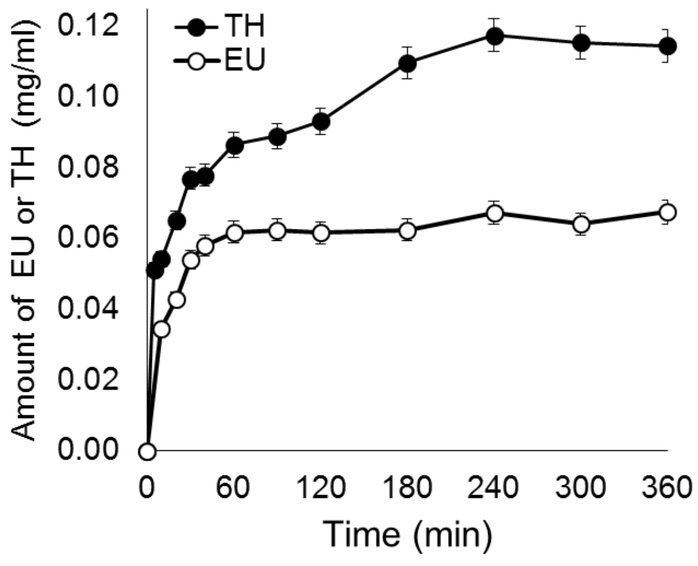


Fig. 3. The released amount of EU and TH from capsules depending on time

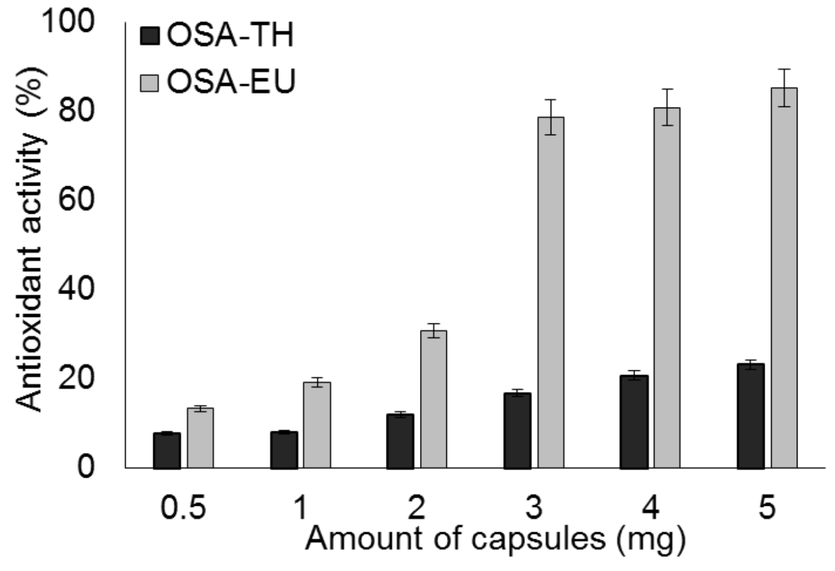


Fig. 4. The antioxidant activity of OSA-EU and OSA-TH capsules

It has been found that encapsulated EU and TH maintain its antioxidant activity and active compounds could be released into ethanol. The study showed that 70 % of EU and 96 % of TH amount were released into ethanol medium over 360 minutes. The antioxidant activity of capsules containing EU was significantly higher than TH. Depending on active compounds concentration in capsules, the antioxidant activity of OSA-EU and OSA-TH was varied from 13 to 85 % and from 8 to 23 %, respectively.

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