DEVELOPMENT OF CARBOHYDRATE-BASED MICROCAPSULES LOADED WITH OMEGA-3 FATTY ACIDS BY CO-AXIAL ELECTROSPRAYING

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INTRODUCTION

Co-axial electrospraying:

- **Produces micro/nano structures by means of high voltage (heat is not required)**
- **The core-shell structure is achieved by physical separation of the solutions (previous emulsification is not required)**
- **Centralized distribution of the encapsulated compounds**
- **High load capacity**

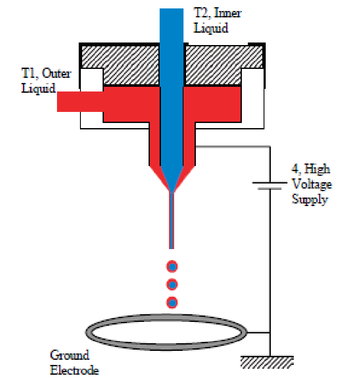

Fig. 1. Co-axial electrospraying process scheme (Loscertales et al., 2002)

OBJECTIVE: To study the feasibility to produce fish oil-loaded microcapsules by co-axial electrospraying using carbohydrate-based systems as wall materials (glucose syrup, GS; pullulan, P)

MATERIALS AND METHODS

- **Preparation of shell solutions:**

Shell sol.	GS, wt%	P, wt%	T20, wt%
SS_1	15	4	1
SS_2	15	4	-

→ **Microfluidizer 9000 psi 3 pases** →

Co-axial electrospray
- **Capsules oil content: 15 wt%**
- **Optimum flowrates and voltage**
- **Distance to the collector: 15 cm**

RESULTS

a) b)

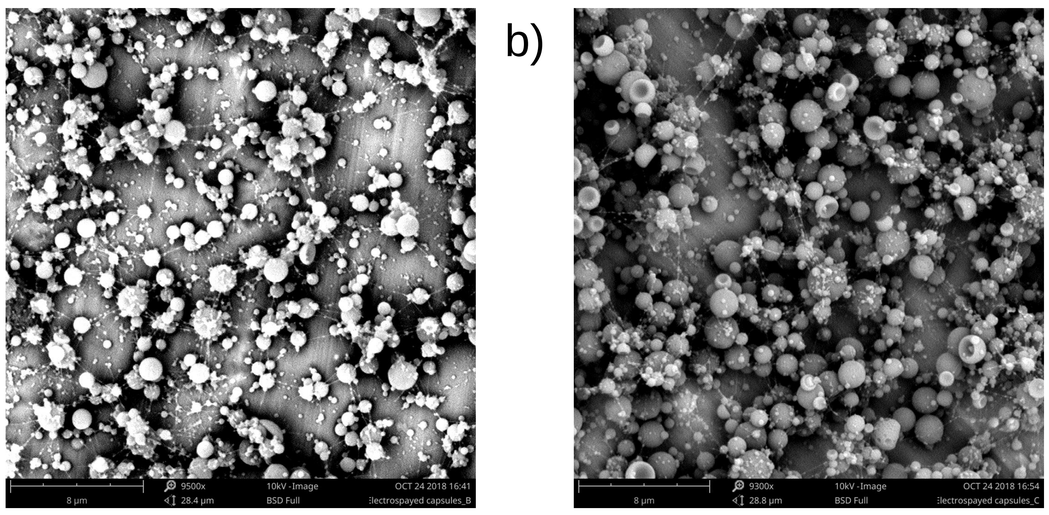

Fig. 2. Morphology of the capsules using the shell solution with T20 loaded with 15 wt.% of fish oil a) 0.42/0.015 mL/h and b) 0.60/0.021 mL/h inner and outter flow rate, respectively. The voltage was fixed to 17 kV.

c) d)

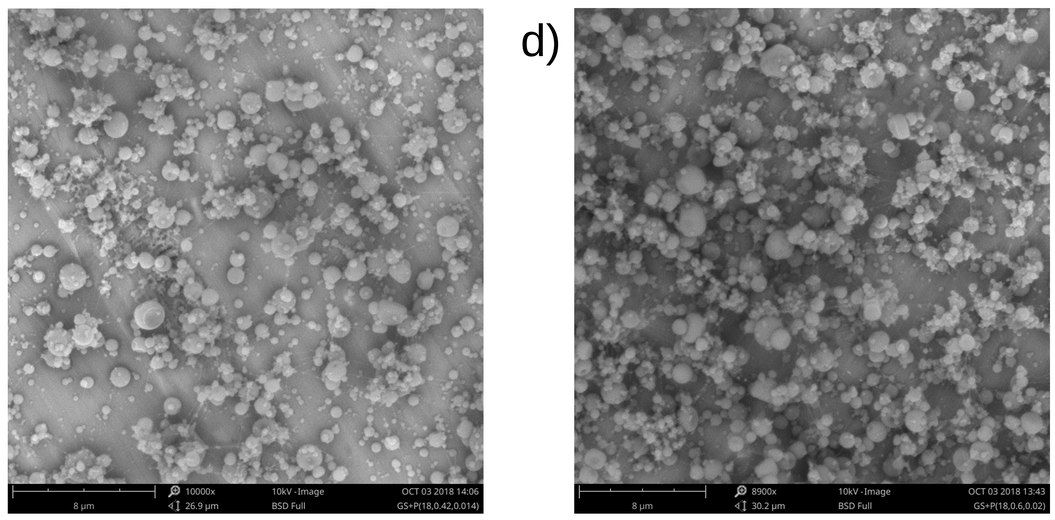

Fig. 3. Morphology of the capsules using the shell solution without T20 loaded with 15 wt.% of fish oil a) 0.42/0.014 mL/h and b) 0.60/0.020 mL/h inner and outter flow rate, respectively. The voltage was fixed to 18 kV.

- **Stable processing conditions**
- **Reproducible at lab scale**

- **Less content of fiber/broken capsules**
- **Not stable processing conditions**

CONCLUSION: THE COMBINED USE OF GLUCOSE SYRUP AND PULLULAN ALLOWED TO PRODUCE CORE-SHELL MICROCAPSULES LOADED WITH FISH OIL BY CO-AXIAL ELECTROSPRAYING AT HIGH THROUGHPUT

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