

**Title:**

**Scale-up production of vitamin-whey proteins coacervates and their protective property against storage degradations.**

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**Abstract:** (Your abstract must use **Normal style** and must fit in this box. Your abstract should be no longer than 300 words. The box will 'expand' over 2 pages as you add text/diagrams into it.)

The production of natural biocarriers for the protection and controlled delivery of bioactives is of great interest to develop natural functional foods, with enhanced health benefits. The feasibility of heteroprotein complex coacervates formed between two whey proteins (WP), Beta-Lactoglobulin (BLG) and Lactoferrin (LF) to efficiently entrap vitamin B9 has been demonstrated. In the present communication, we investigated the bench scale production of such B9 loaded BLG-LF coacervates (B9-WP coacervates) and their protective ability against B9 degradations during storage (freeze-drying, UV light radiations and accelerated H<sub>2</sub>O<sub>2</sub> induced oxidation).

Complex coacervation was performed at bench scale, using commercial protein solutions. The efficiency of two mixing systems, batch versus continuous, were compared. In the continuous mixing system, the formation of B9-WP coacervates was found to be flow-dependant (Figure 1). The highest WP coacervation yield was obtained for a minimum flow rate of 200 mL/min. Under optimized conditions, bench scale efficiency similar to that found for laboratory scale was reached with a coacervation yield of 65 % and a B9 entrapment of 98 %, demonstrating an efficient scaling-up. When entrapped into WP coacervates B9 showed higher stability during freeze-drying with a loss of about 3%, compared to 12% obtained for free untrapped B9. Additionally, WP coacervates showed good protective effect of B9 against UV irradiation and H<sub>2</sub>O<sub>2</sub> induced oxidation.

Hence, heteroprotein complex coacervates constitute a promising biocarriers for the protection of bioactives against chemical and physical degradation. For controlled delivery purpose, *in vitro* and *in vivo* studies are in progress to evaluate the effectiveness and optimal release of entrapped B9 molecules.

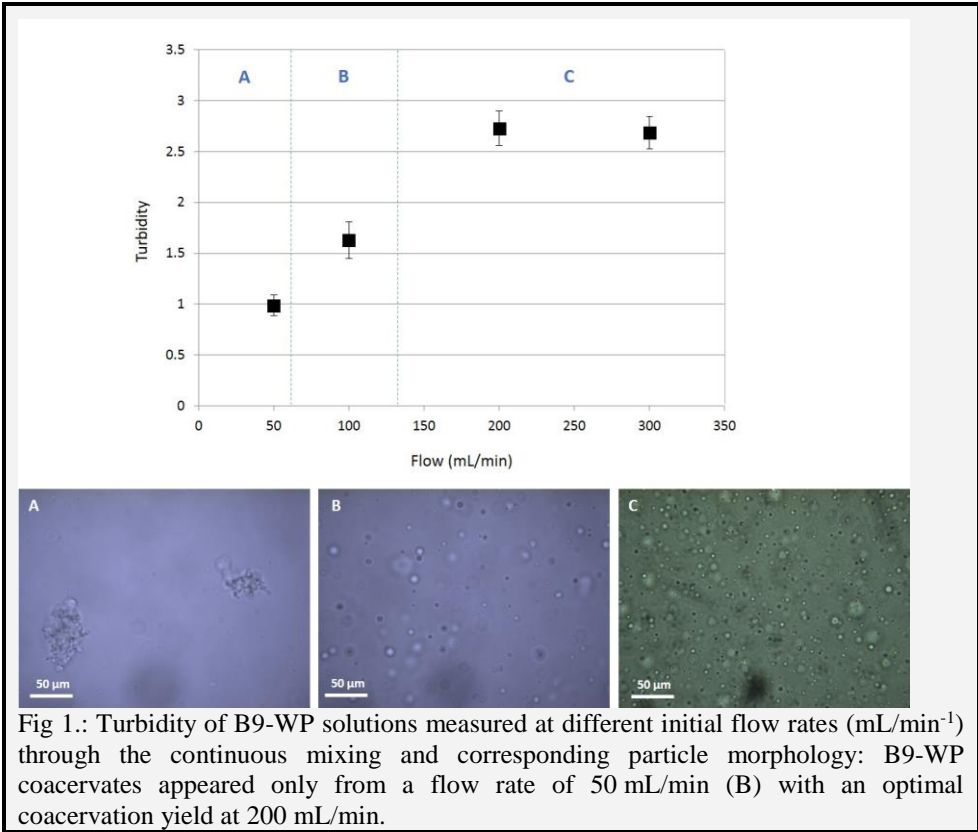


Fig 1.: Turbidity of B9-WP solutions measured at different initial flow rates (mL/min<sup>-1</sup>) through the continuous mixing and corresponding particle morphology: B9-WP coacervates appeared only from a flow rate of 50 mL/min (B) with an optimal coacervation yield at 200 mL/min.