

Synthesis of chitosan - *Spirulina* microcapsules via ionic gelation and characterization

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Spirulina, which belongs to genus *Arthrospira platensis*, is a nutritionally rich microalga, having high protein content and widely used in the field of aqua culture. Despite its nutritional benefits, the direct use of *Spirulina* in aquatic systems is constrained by its high solubility and rapid nutrient leaching. This will reduce its efficiency as a feed component. To address these limitations, the present study focused on chitosan encapsulated *Spirulina* microcapsules (CS-SMCs) via ionic gelation method with sodium tri poly phosphate (STPP) as a crosslinker and microcapsule characterization. The optimized formulation (1.5% chitosan, 0.5% STPP and 1:20 *Spirulina* to water) with a high encapsulation efficiency of $93.9 \pm 2.0\%$. The synthesized microcapsules are subjected to comprehensive physicochemical characterization

by Fourier Transform Infrared Spectroscopy (FTIR), Scanning Electron Microscopy (SEM), and thermogravimetric analysis (TGA). FTIR confirmed successful encapsulation with characteristic peaks at 3285 cm^{-1} (O-H and N-H stretching) and $1638\text{--}1547\text{ cm}^{-1}$ (amide I and II bands). SEM revealed predominantly spherical morphology with an average particle size of $880 \pm 88\text{ }\mu\text{m}$. TGA indicated improved thermal stability compared to free *Spirulina*. Overall, the findings demonstrate that chitosan encapsulation effectively enhances the physical stability of *Spirulina* for aquaculture applications.

Keywords:

Chitosan microcapsules, *Spirulina*, ionic gelation, characterization