

T8-P4: Protein-functionalized silver nanoparticles from *Arthrospira platensis* for advanced biomedical applications

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Proteins from *Arthrospira platensis* are valued for their high content and balanced essential amino acid composition, making them a promising source of nutraceuticals and bioactive compounds. Their functional groups can also act as reducing and stabilizing agents in nanoparticle synthesis and biofunctionalization, providing colloidal stability and specific biological activities.

In this study, protein fractions were extracted from demineralized *Arthrospira platensis* biomass using alkaline NaOH (0.45%) treatment, neutralized, and standardized to 10 mg/mL. For biofunctionalization, silver nanoparticles (AgNPs, 20 nm) were added to the protein extract (100 µg per 10 mL) and stirred for 12 h at room temperature. FTIR analysis revealed significant spectral modifications upon AgNP functionalization, including attenuation and shifts of O–H, N–H, and C=O bands, as well as the appearance of new C–H stretching signals. These changes indicate hydrogen bonding, electrostatic, and coordinative interactions between AgNPs and protein functional groups, leading to a restructured “fingerprint” region characteristic of a novel bioactive complex.

The protein extract after biofunctionalization exhibited reduced reducing power but enhanced antioxidant activity compared to the native protein fraction, confirming alterations in its biochemical properties. The resulting colloidal complex demonstrated improved nanoparticle dispersion and stability, preventing aggregation through protein surface interactions. Such enhanced colloidal stability and biological activity highlight the potential of *Arthrospira platensis* protein-AgNP complexes for biomedical applications, particularly in wound dressings designed to promote healing and prevent infections.

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