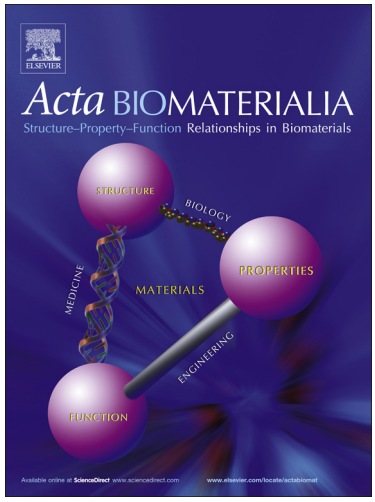

Polyamphoteric flocculants for the enhanced separation of cellular suspensions

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Abstract:

The efficient concentration and separation of microorganisms from dilute culture suspensions is crucial to the success and productivity of many biotechnological processes. This article presents the design and characterization of polyamphoteric flocculants with a tunable, zwitterionic character for the enhanced separation of biocolloidal suspensions of yeast, wastewater, microalgae, and potentially other cellular systems. The polyamphoteric flocculants have overall molecular charges dependent upon the system pH, thereby providing a strong electrostatic attraction to the diverse but predominantly negatively-charged cellular surfaces of the biological suspensions. The polyamphoteric flocculants with tailored charge character are shown to have higher flocculation efficiencies than comparable cationic polyelectrolytes, and have an enhanced ability to 1) adsorb to the diverse range of charge character in cellular suspensions, 2) operate over an extended range of suspension pHs, and 3) operate at lower flocculant concentrations. These enhanced flocculation properties are shown to arise, perhaps counterintuitively, due to interactions between the negatively-charged functionality on the flocculant and the predominantly negatively-charged biocolloids.

Keywords: Polyampholyte; flocculation; *Chlorella vulgaris; Saccharomyces cerevisiae;* wastewater