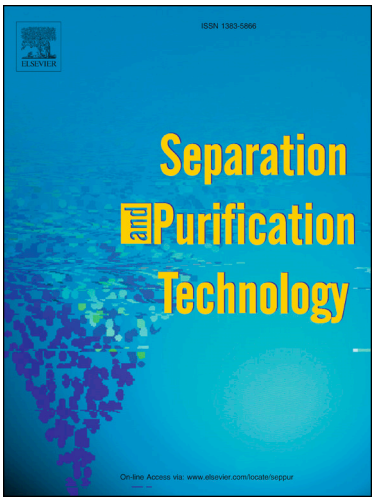

Polyelectrolyte based technique for sequestration of protein from an aqueous phase to an organic solvent

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Polyelectrolyte based technique for sequestration of protein from an aqueous phase to an organic solvent

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Abstract

Separation of proteins from a complex multi-component suspension of broken down cells is technically challenging. In this regard, a technique that is capable of distinguishing proteins from other major cellular components (such as carbohydrates, lipids, and other cellular debris) could immensely simplify downstream processing. In this work, we report the ability to use the inherent zwitterionic properties of proteins to latch amphiphilic cationic electrolytes on to protein surfaces so that proteins can be extracted from an aqueous suspension into a water-immiscible organic solvent. Here we show the separation of egg albumin (a model protein) from an aqueous suspension to adjacent hexane phase using poly-(diallyl dimethyl ammonium) chloride (PolyDADMAC). Results show that, under optimum pH and polyelectrolyte concentrations, proteins can be successfully migrated from water to the adjacent hexane phase. The amount and molecular weight of electrolyte, and solution pH played vital roles in determining the amount of protein that could be migrated. Low molecular weight polyelectrolyte under neutral pH conditions, low equilibration time and 1:2 hexane: water ratio favored highest protein separation (~85% dry weight). FTIR studies indicated that the secondary structure of the protein was preserved after migration of the protein from the aqueous phase to solvent under the protection of the polyelectrolyte coating. The results suggest that ionic electrolytes with hydrophobic moieties could be used as molecular transport vehicles to safely separate proteins from a bulk aqueous phase to an immiscible solvent phase.

Keywords: polydadmac, protein, separation, cationic polyelectrolyte, hexane