

Post Doc (Research Associate) Position

Essential Job Duties:

- The Post Doc (Research Associate) is expected to work closely with Dr. Ruben G. Carbonell on the development of novel grafted nonwoven membranes for the purification of proteins from complex mammalian cell culture supernatants in the Carbonell-Menegatti Bioseparations Laboratory and at the Biomanufacturing Training and Education Center (BTEC) at NC State University.

Specifically, the project aims to develop grafted nonwoven fabrics via UV and Heat-Induced grafting. Charged ligands will be attached to the grafted nonwoven fabrics to develop membranes for cation and anion exchange. In addition, small molecule ligands will be coupled to the grafted layers for affinity separations of proteins.

The postdoctoral project aims to: (i) develop and optimize the grafting conditions using UV grafting and Heat-Induced grafting, (ii) develop and optimize the ligand attachment chemistries to enable ion exchange and affinity capture of proteins from a biological, (iii) characterize the membranes in terms of porosity, flow properties, ligand density, static and dynamic protein binding capacity and selectivity of binding, and (iv) characterize the performance of the membranes during purification of biologics (proteins, viruses) from real mixtures, including mammalian cell culture, human plasma, yeast and bacterial fermentations. This would include measurements of product yield, product purity, DNA removal and host cell protein (HCP) removal.

- The person will conduct UV and Heat-Induced grafting experiments at various process conditions, and will carry out appropriate liquid-phase chemistries to attach anionic and cationic ligands, as well as small molecule affinity ligands for specific separations. The person in the position will also characterize the %weight due to grafting, the ligand density resulting from the ligand attachment chemistries, and perform measurements of overall porosity and flow permeability for the resulting membranes. Finally, the individual will carry out detailed purification studies with model protein mixtures and with real mixtures from Chinese Hamster Ovary (CHO) cell culture, yeast fermentations (*P. pastoris*) and MDCK cell lines. The product will be characterized using ELISA techniques and SDS-PAGE to measure product yield and purity, and special assays for HCP and DNA removal.

- The Research Associate will help supervise and mentor undergraduate and graduate research assistants as well as collaborate with partners at universities, industry and government laboratories. This person is expected to make presentations at national and international meetings, help write research proposals to support the work of the Carbonell laboratory, and help write manuscripts and other publications of research results.

- The Research Associate is also expected to assist in managing laboratory operations such as safety, supplies, maintaining laboratory notebooks and other duties, as assigned by Dr. Carbonell and Dr. Menegatti.

Minimum Experience/Education:

- Ph.D. or equivalent doctorate (*e.g.*, D.V.M., Sc.D.) awarded in appropriate field, *e.g.*, chemistry, biochemistry, chemical engineering, and the like.
- No more than five (5) years from initial date of the first postdoctoral appointment.

Minimum Research Experience:

Applicant(s) should have solid background in polymer chemistry and surface modification techniques, purification or biologics, as well as bio-analytical techniques. Among the skills required of this position:

- Polymer grafting and surface modification;
- Chemistry associated with polymer grafting and ligand attachment to grafted surfaces;
- Conjugation of small molecule ligands on membrane supports;
- Protein purification by chromatography; specifically, experience with ion-exchange, hydrophobic interaction, multimodal, and affinity chromatography;
- Bioanalytical techniques: ELISA, SDS-PAGE, isoelectric focusing, PCR, etc.

Purpose of position – This position is for the development of novel nonwoven membranes for the purification of proteins from complex biological mixtures using cross-flow or tangential flow filtration. Specifically, the project aims to identify membranes that have high product binding capacities and excellent flow properties.

Basis for request – The Carbonell / Menegatti research group needs additional help to support the work of graduate and undergraduate students, and to obtain funding from federal and industry grants. This position will work with other postdoctoral and graduate students in the laboratory.