# Biomolecular Interaction Technologies Center (BITC)

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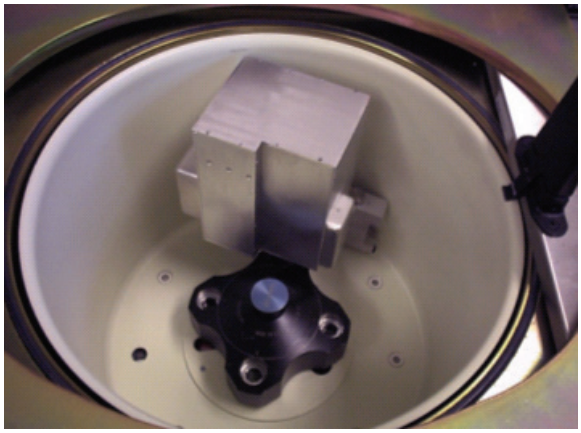
## Fluorescence Detection Optical System

The analytical ultracentrifuge (AUC) is widely used in academic and industrial laboratories to characterize molecular interactions. AUC use in drug discovery research is increasing as a result of advancements in optical systems, accessories and software for this instrument funded by the Biomolecular Interaction Technologies Center (BITC). A fluorescence detection optical system with unparalleled sensitivity and selectivity has been licensed by the University of New Hampshire to Aviv Biomedical, Inc. for commercial production. In 2006, a new company, Spin Analytical, Inc., licensed the technology to produce accessory items: specialty sample holders, a cell alignment tool and an automated cell washer.



Spin Analytical's unique sample holders (cells) allow researchers a wider variety of options in designing their experiments. In drug discovery, it can be necessary to use only a minute amount of molecule in solution, or to work with very high concentrations. Spin Analytical has produced an alignment tool to eliminate human error in aligning cells by eye, and an automated cell washer that saves time and can reduce human exposure to hazardous substances. Aggregation of injectable protein therapeutics is of great medical concern to BITC members. The Food and Drug Administration has encouraged the pharmaceutical companies to use multiple methods to test their products for aggregates. Three BITC member companies have shown that the improved accuracy offered by Spin Analytical technology is critical to the proper characterization of small quantities of aggregates.

The Federal Drug Administration has recognized the value of sedimentation velocity experiments in the analytical ultracentrifuge in characterizing the physical properties of molecules under consideration as drug candidates. For example, the tendency of a large protein molecule to self-associate in solution can result in aggregation. In the human body, drug aggregation and other problems associated with the metabolism of a drug in blood serum can lead to anaphylactic shock, an often fatal condition. These accessories for the analytical ultracentrifuge assist scientists in developing safe and effective drugs. As an independent start-up company, Spin Analytical, Inc., can be responsive in meeting varying needs of these laboratories. For more information, contact Dr. Thomas M. Laue, 603.862.2459, tom.laue@unh.edu.

## Method to Measure High-Affinity Interactions of Macromolecules

Until now, there have been few experimental methodologies to measure very high-affinity interactions of macromolecules--interactions that are important in biological systems and in developing new therapeutic drugs. Research at the Biomolecular Interaction Technologies Center (BITC) has led to a method of making such measurements using a fluorescence optical system for the analytical ultracentrifuge in combination with fluorescent tagging of a macromolecule in the complex. The method allows chemical parameters to be determined for the formation of the complex, such as stoichiometry, equilibrium association constant, and thermodynamics of the interaction. When the project is completed in 2004, the technology will allow a researcher to study high-affinity binding as well as investigate any complex linked association/dissociation phenomena occurring with the binding event. For more information, contact Dr. Thomas M. Laue, 603.862.2459, tom.laue@unh.edu.

## Absorbance Optical System and Data Acquisition Software for the Analytical Ultracentrifuge

A new high-precision absorbance optical system and data acquisition software for the analytical ultracentrifuge developed by BITC will improve the throughput of analytical ultra-centrifugation. Without Dr. Laue's effort, this advance would not be possible: Beckman, the company that developed the analytical ultracentrifuge, had not designed further upgrades since launching the instrument in early 1990s. Currently, the Beckman absorbance optical system uses a flash lamp and moving slit over a photomultiplier tube and operates too slowly to acquire data for sedimentation velocity experiments suitable for rapid analysis. The new system will aid drug discovery research in pharmaceutical companies. For more information, contact Dr. Thomas M. Laue, 603.862.2459, tom.laue@unh.edu.