

# Characterize the Behavior of Protein Molecules In Concentrated Environments Using Small-Angle Scattering

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Understanding the behavior of protein molecules in concentrated environments paves the ground for both fundamental and applied research. For example, high protein concentrations can be found in many applications, ranging from membrane-less organelles that carry significant biological functions, to monoclonal antibody (mAb) formulations used in cancer therapy. The high protein concentration poses challenges for conventional biophysical characterization methods. Among others, small-angle scattering represents a unique characterization approach for concentrated protein samples. Recent studies from our group used small-angle X-ray/neutron scattering (SAXS/SANS) to predict the physical stability of concentrated mAb formulations by characterizing the non-specific protein-protein interactions among crowded mAb molecules. Moreover, since scattering profiles provide structural information over a wide range of length scales, we show that different approaches can be applied to interpret the scattering data for detailed information on the interactions and conformation of proteins in concentrated environments. The demonstrated methodology extends the use of a small-angle scattering technique for characterizing the behavior of protein molecules in concentrated environments relevant to their biological functions.