Microcalorimetry: A versatile tool for the characterization of biomolecular interactions.

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Higher-order biomolecular structures and their dynamic interactions with various ligands drive and regulate all biological processes; studies of biomolecular interactions are fundamentally important in all areas of life sciences. Isothermal titration calorimetry (ITC) is the ideal technique for the measurement of biological binding interactions since the data provided does not rely on the presence of chromophores or fluorophores, nor requires an enzymatic assay. ITC relies only on the detection of a heat effect upon binding and it is label-free, enabling scientists in academia and industry to better understand the conformational stability of their biomolecules and their binding to biologically relevant interactants.

This presentation covers the principles of Differential Scanning and Isothermal Titration Calorimetry (DSC and ITC) and exemplifies a broad range of applications enabled by the direct nature of the technique.

A special focus will be given to the benefits of PEAQ-ITC, the latest generation of MicroCal ITC instrumentation, and the solutions it offers for addressing current bottlenecks associated with the interaction analysis. Among the most recognized challenges is the need to adequately address a broad range of binding affinities and to reliably interpret the binding data, complicated by the presence of inactive protein or inherent uncertainty in the concentration of the ligand.

We will discuss the improvements in PEAQ-ITC data quality which enables increased confidence and data resolution when measuring low heats at low or uncertain sample concentrations and complex binding modes.

The new MicroCal PEAQ-ITC analysis software will also be presented: The new software allows for automated data analysis, minimizing analysis time and user subjectivity in assessing data quality as well as allowing the analysis of large data sets of 50 or more experiments in a matter of seconds.