MODEL BASED CONTROL OF CONTINUOUS BIOPROCESSES

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Monitoring and control of biotech processes is non-trivial. Most unit operations are complex and have non-linear dynamics which makes it difficult to model, monitor and control. Complexity of this exercise increases further when we think of continuous processes. This talk will aim to elucidate how optimal choice of analytical method, process model and control architecture can be used for optimal control of continuous bioprocesses. Multiple case studies will be presented to elucidate the key concepts. These case studies will address key unit operations, including bioreactor, acoustic wave separation, process chromatography, and ultrafiltration. Each case study will demonstrate how clever selection of analytical tool (NIR, Raman, FTIR, HPLC etc.), process modelling (mechanistic or empirical), and control scheme (PID or NN or other advanced controls) can together deliver the primary objective of PAT which has been defined as “a system for designing, analyzing, and controlling manufacturing through timely measurements (i.e., during processing) of critical quality and performance attributes of raw and in-process materials and processes, with the goal of ensuring final product quality”. Overall, these measures can accelerate process development and enhance productivity.