



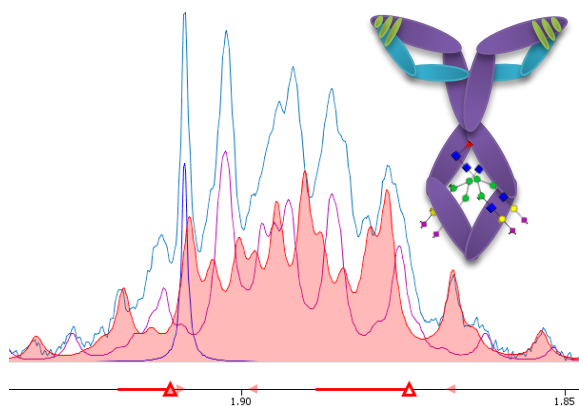
Chemical & Physical Sciences
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Metabolomics for Cell Culture Bioprocess Engineering: Making a Better Antibody



Opportunities abound in cell culture engineering for leveraging the capabilities of metabolomics for improving the productivity and consistency of bioprocesses. Observed as the cumulative result of regulatory interactions from cellular functions, a profiled metabolome (consisting of the exo- and endo-metabolome) provides a time-point characterization of the cellular phenotype for cultured cells. Such characterizations can provide greater insight into “the black boxes” that are cells, than single component measurements. As a result, often ignored metabolites can now play pivotal roles in the optimization of prokaryotic and eukaryotic platforms

operated in various culture modes. Though the resulting size of the datasets can present challenges, shifting the focus away from experimentation to analysis can lead to cost effective operations. The metabolomics approach in our work has focused on the utility of nuclear magnetic resonance (NMR) experiments for targeted metabolite profiling. The broader dataset obtained from simple sample preparations have spanned a diverse range of applications, including, though not exhaustively, the production of: antibodies in Chinese hamster ovary (CHO) cells; viral proteins and viral vectors in insect cells; biofuels in *Escherichia coli*; and therapeutic microbial consortiums derived from human feces. This talk will highlight how merging an advanced analytical technique based on NMR with key (bio)chemical engineering concepts is aiding in the advancement and development of bioprocesses especially in terms of understanding the production of therapeutic monoclonal antibodies with specific glycosylation patterns: a highly relevant topic these days given the Ebola virus outbreak and the use of monoclonal antibodies to help counter the associated disease.