BioCrystallisation

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Abstract: The purification of high molecular weight new modalities such as proteins and peptides, for their use in biopharmaceutical drug therapeutics, can still account for a significant proportion of the drug development cost. However, advances in the optimisation of crystallisation conditions have seen significant increase in the scalability of peptide/proteincrystallisation. Crystallisation remains an attractive isolation step for pharmaceutical products due to its unique ability to purify and control other properties such as particle size distribution, morphology, and polymorphism. In addition, crystallisation offers pharmacokinetic advantages such as better release control and higher bioavailability, and lower impurity loading. This talk will focus on my group's recent efforts to control nucleation and crystallisation of complex macromolecules such as proteins and homo-peptides; using 3D-nanotemplates for a range of model proteins (eg thaumatin, con A, catalase, etc) and the use of soft templates (eg amino acids) for insulin and the crystallisation behaviour of simple short-chain peptides. For peptides, the effects of chain length and thermodynamic properties (eg solubility) is determined to establish a rational design of the crystallisation conditions using glycine homopeptides as a model. The talk will also present results from our solubility studies for simple peptides in single and binary solvent mixtures, the effect of sequence and protection groups on solubility of peptides, and finally discussing their crystallisation behaviour in the absence and presence of templates. This talk will provide some insights into the challenges and opportunities in crystallisation as a purification unit process for proteins and peptides.

Keywords: Crystallization; Nucleation; Proteins; Peptides