Oral presentation

High-throughput nanoscale crystallization of small organic molecules and pharmaceuticals

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Modern material characterisation at atomic structural resolution is heavily dependent on the availability of single, high-quality crystals for analysis by Single Crystal X-ray Diffraction (SCXRD). However, successful crystallisation, including access to different polymorphs, hydrates, solvates and co-crystals can only be achieved through the rigorous exploration of large areas of experimental space. Achieving this through classical methods is challenging, due to the need for both large quantities of sample and extensive operator time.

Approaches to searching crystallisation space have undergone a 'step-change' in recent years with new techniques [1-4] becoming available via technological advancements in liquid handling [5]. One of these techniques is Encapsulated Nanodroplet Crystallisation (ENaCt), allowing rapid exploration of crystallisation space, with multiple experimental conditions screened in parallel whilst using only micrograms of analyte (Fig. 1) [4, 6-9].

The high-throughput nature of this technique generates a large amount of data, enabling trend analysis to highlight crystallisation 'hot spots', giving potential to build predictive models. In this work, the newest developments of ENaCt, and how this technology can be applied to a wide range of small molecule crystallisation challenges will be presented. These include structural and stereochemical elucidation, analysis of pharmaceutical molecules, discovery of polymorphs and as a screening tool for multi-component crystals.

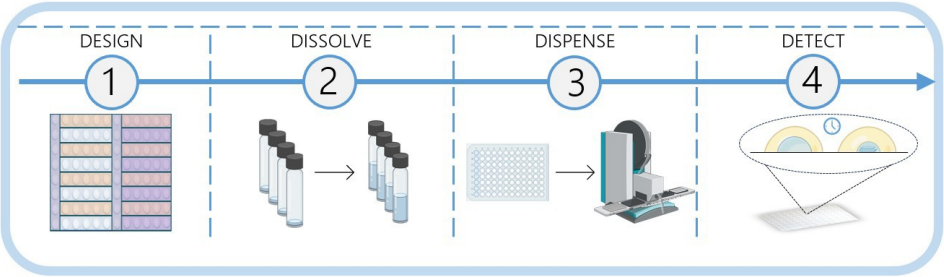

Figure 1. Overview of the Encapsulated Nanodroplet Crystallisation (ENaCt) technique.

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