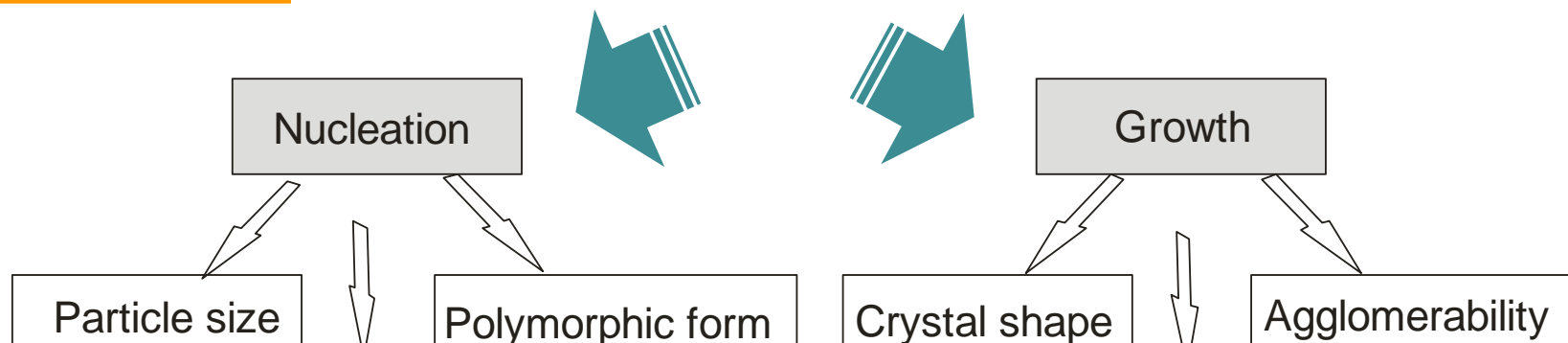


# Crystallisation Science & Engineering @ Leeds: Particle Design, Formation & Manufacture

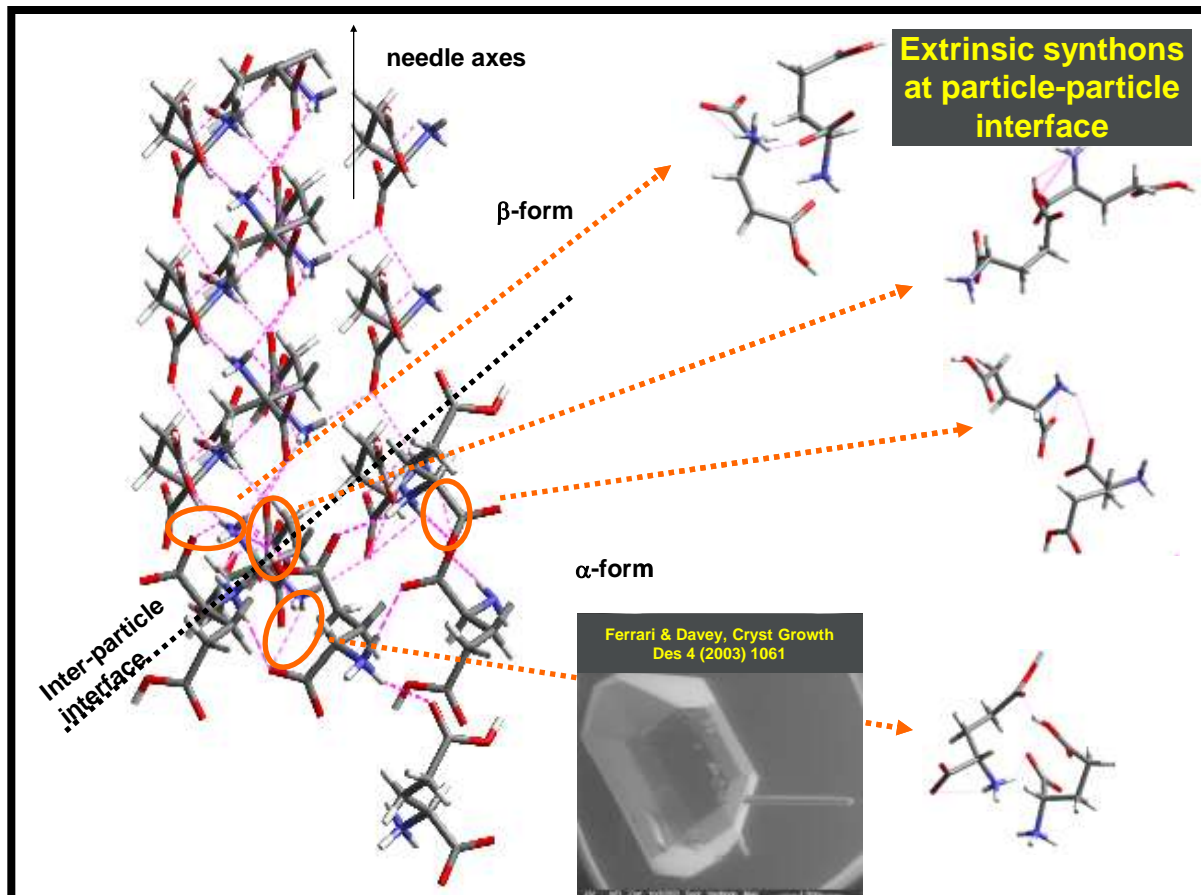


- **Crystallisation: key process in manufacture of pharmaceutical & fine chemical products**
  - ❑ Effects solid-liquid isolation & separation
  - ❑ Enables product purification
- **Process driven by supersaturation involving two key steps which effect the design of particles formed**
  - ❑ **Nucleation: dominant step - many small crystals**
  - ❑ **Growth: dominant step - fewer larger crystals**

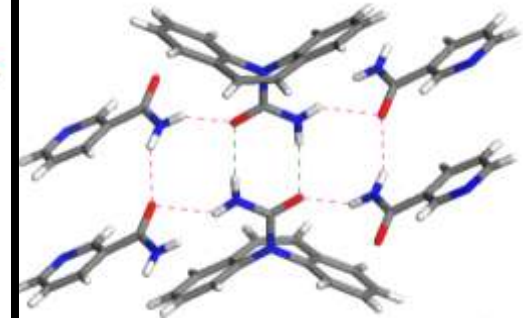


**Controlling nucleation vs growth balance: key to direct solid form structure, properties & function**

# Crystallisation Science & Engineering @ Leeds: Synthonic Engineering & Design



valent bonds



Intrinsic synthons: cbz-nt (1:1)  
Co-crystal homo-synthon cbz-cbz & hetero-synthon cbz-nt

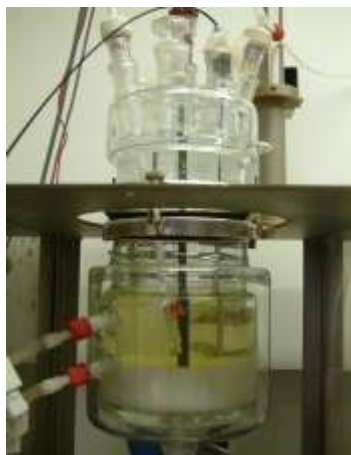
thons

*rinsic* synthons

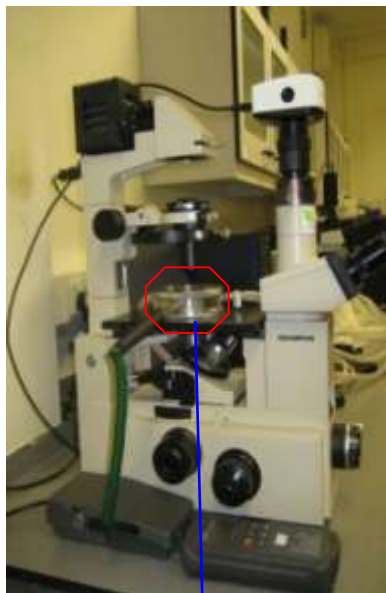
direction

**Synthonic engineering: modelling control of directed assembly for molecular-scale materials design**

# Crystallisation Science & Engineering @ Leeds: Experimental Facilities – Crystallisers & Analysis



2 litre SIMULAR reactor system



- Batch reactor vessels at 0.2ml, 1ml, 5ml, 100ml, 500ml, 2l, 20l & 100l scale sizes
- Larger vessels equipped with solids & liquid dosing together with range of PAT systems
  - ❑ Reaction calorimetry, XRD, NIR, FBRM, turbidometry, ATR FTIR/UVvis, ultrasonic spectroscopy & digital video microscopy
  - ❑ plus temperature, turbidity & pH probes
- Smaller reactors have lesser capabilities but have more reactors



8 pot 5ml CRYSTALLINE reactor system



**Multi-scale measurements: pre-requisite for effective crystallisation process development**