

Process Characterisation of Crystal Formation and Structural Investigation of Crystal Growth

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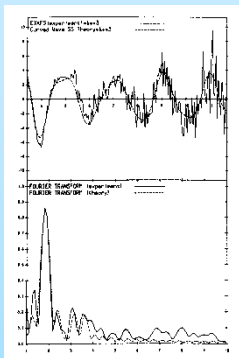
Institute of Particle Science and Engineering

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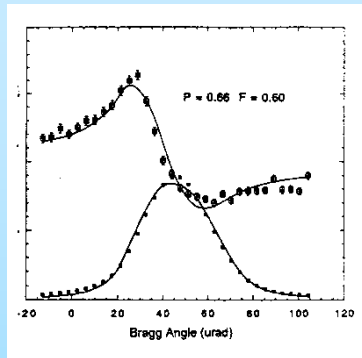
Research Areas

- Crystal growth and habit modification by impurity;
- Characterisation for crystallisation;

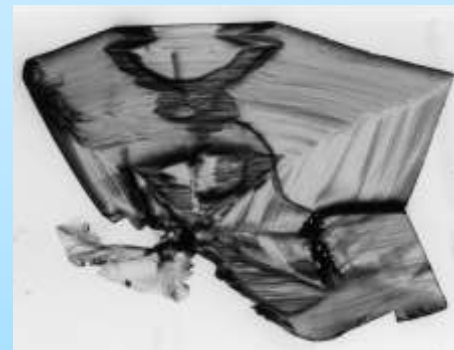
Crystal habit modification by impurity: Detecting structure and habit modification mechanism



**EXASF
(bonding)**

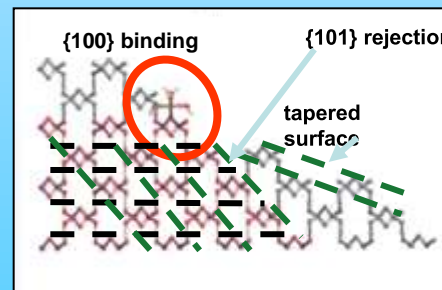


**X-ray Standing
Wave (impurity
position)**



**X-ray topography
(history & mechanism)**

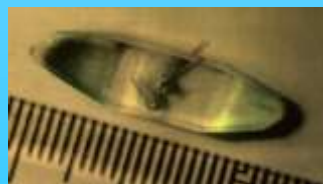
**Surface
chemistry
found**



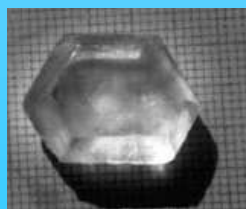
**Habit
modification
mechanism**



KH_2PO_4 (KDP)



**Cr^{3+} doped
KDP**



K_2SO_4



**Dye molecule
doped K_2SO_4**



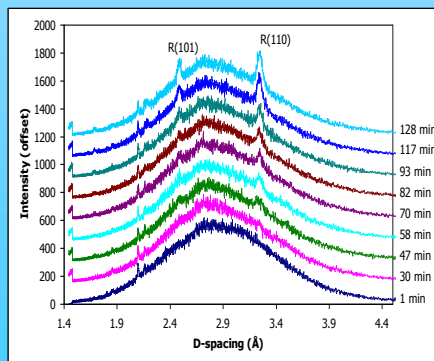
**NaClO_3 with
 $\text{S}_2\text{O}_6^{2-}$**



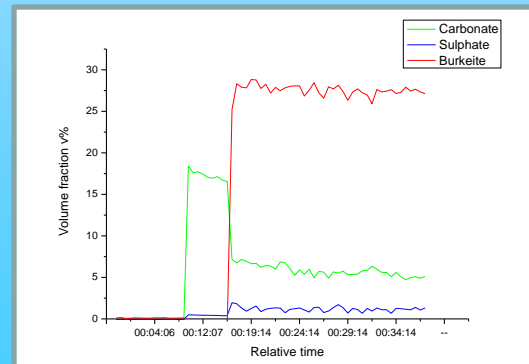
**Twins of NaClO_3
with $\text{S}_2\text{O}_6^{2-}$**

Characterisation and Control of Crystallisation

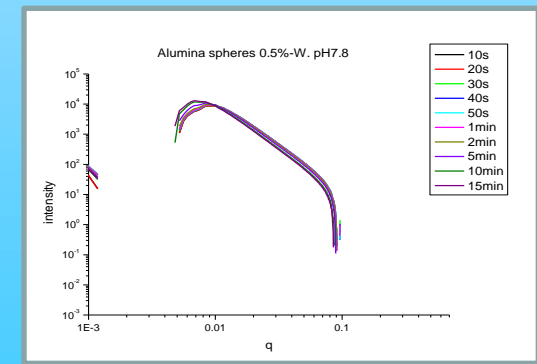
- Polymorphic transformation - in situ lab / synchrotron energy dispersive XRD and Raman spectroscopy
- Nanoparticle formation – SAXS/WAXS
- Power ultra sound crystallisation – crystal size and form kinetics control
- Ultrasound spectroscopy - in situ crystal sizing and supersaturation measurement and control
- Dynamic catalysed conglomerate crystallisation – 1-step high yield chiral chemical separation
- Nano crystal synthesis
- Thermodynamic monitoring of crystallisation – reaction calorimeter



synchrotron EDXRD
nanoparticle synthesis



Process Raman
co-crystal kinetics monitoring



synchrotron SAXS
nanoparticle aggregation
monitoring