



The Centre for Process Innovation

Advanced Processing and COBR Technology A Pragmatic Approach

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What we do

We drive

Innovation

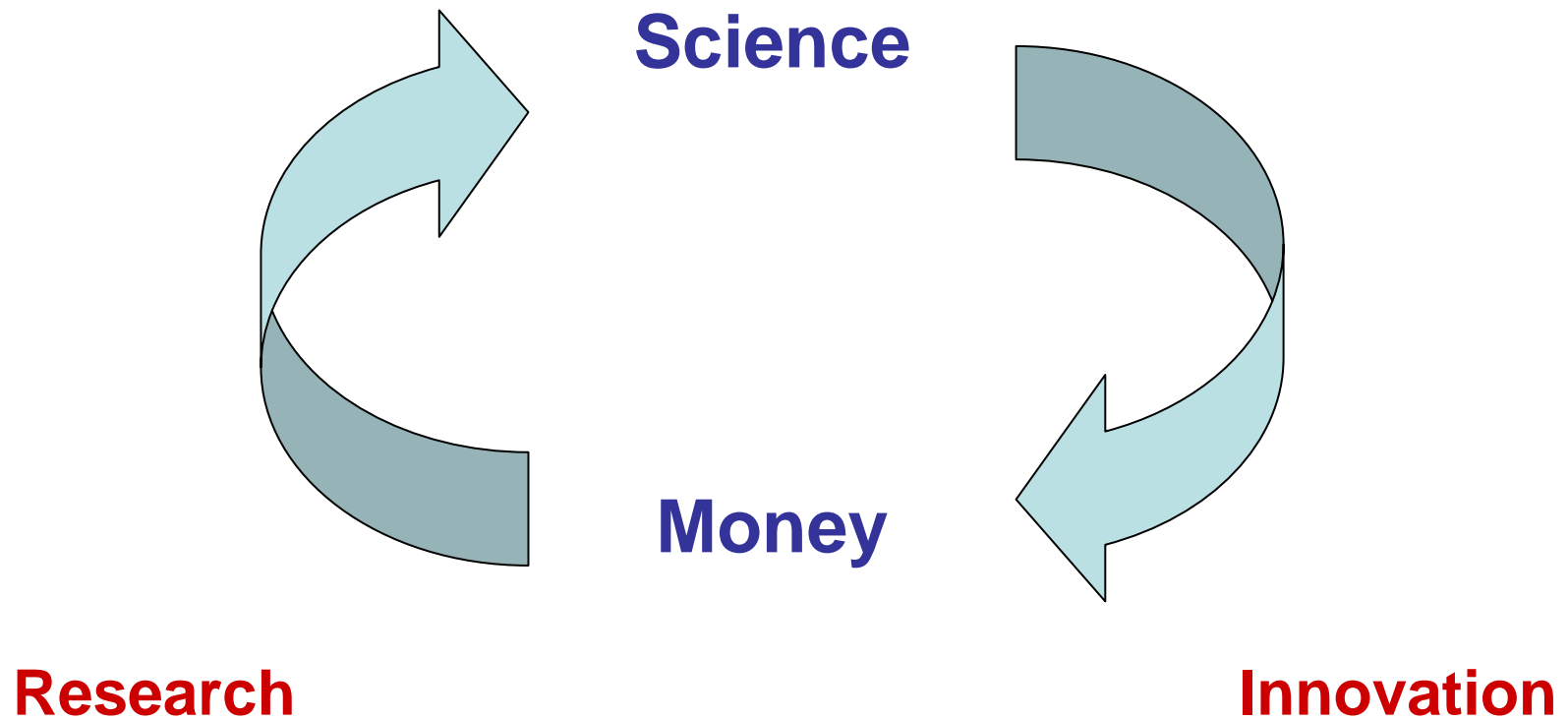
by reducing risks and barriers

through collaboration

.....*the future inspired*



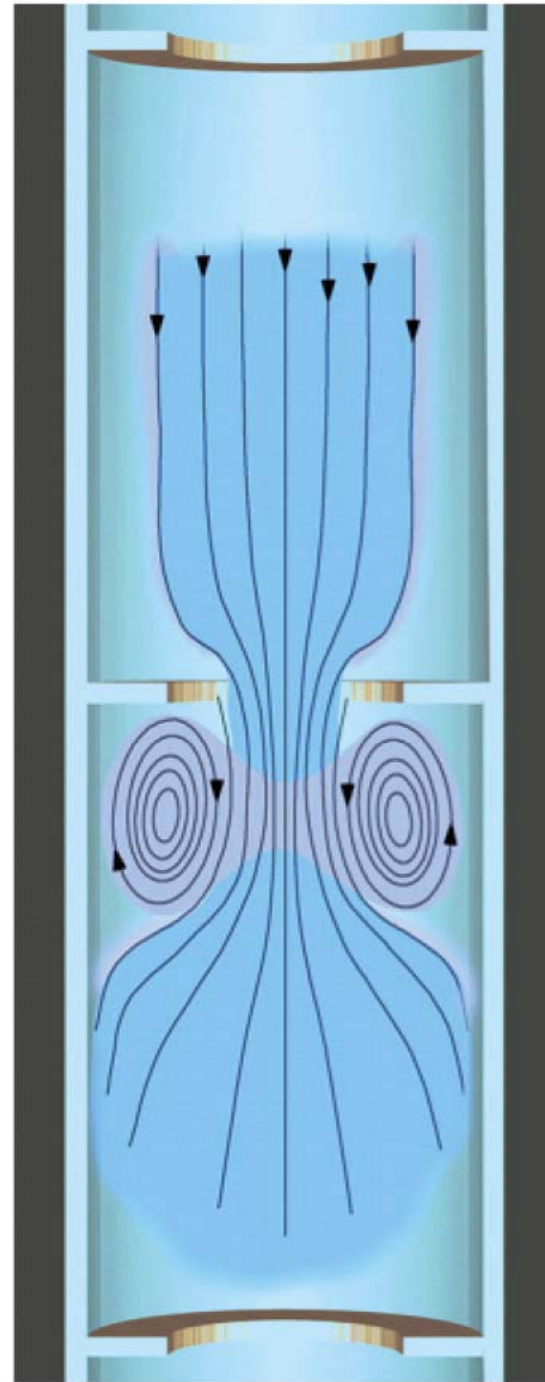
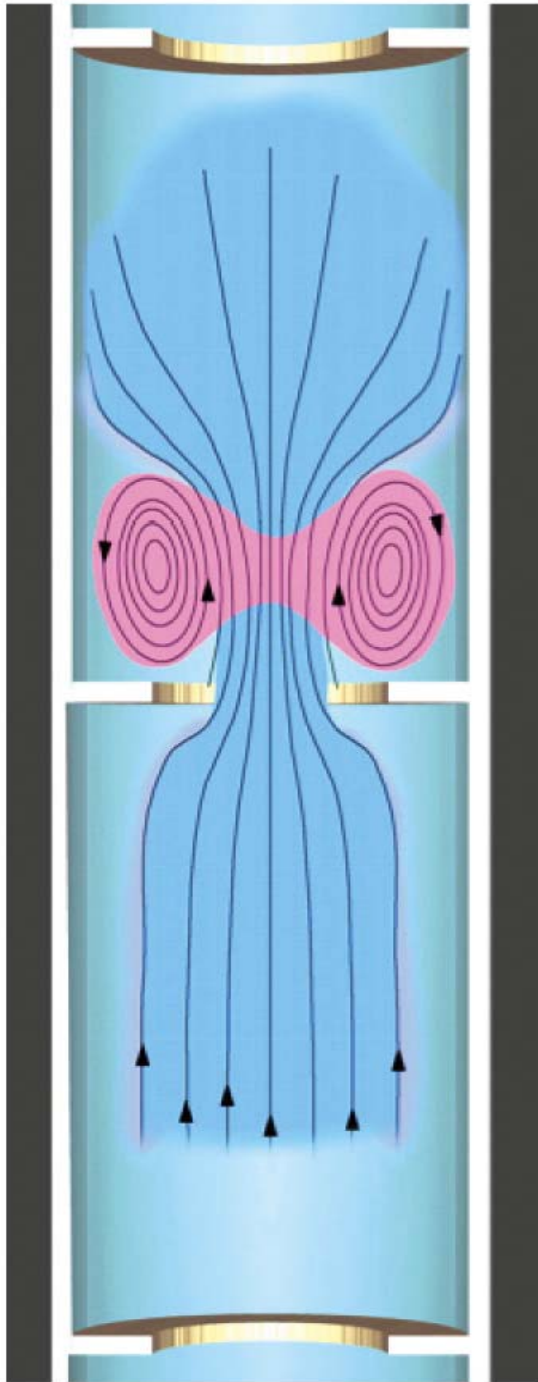
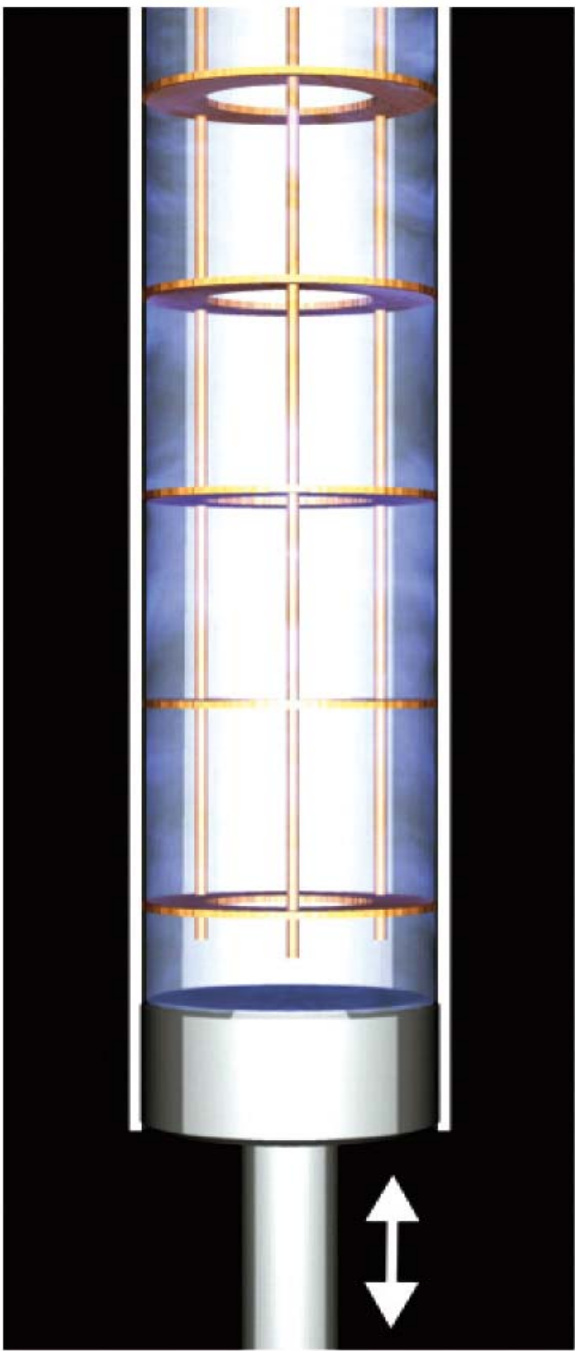
Innovation and Science



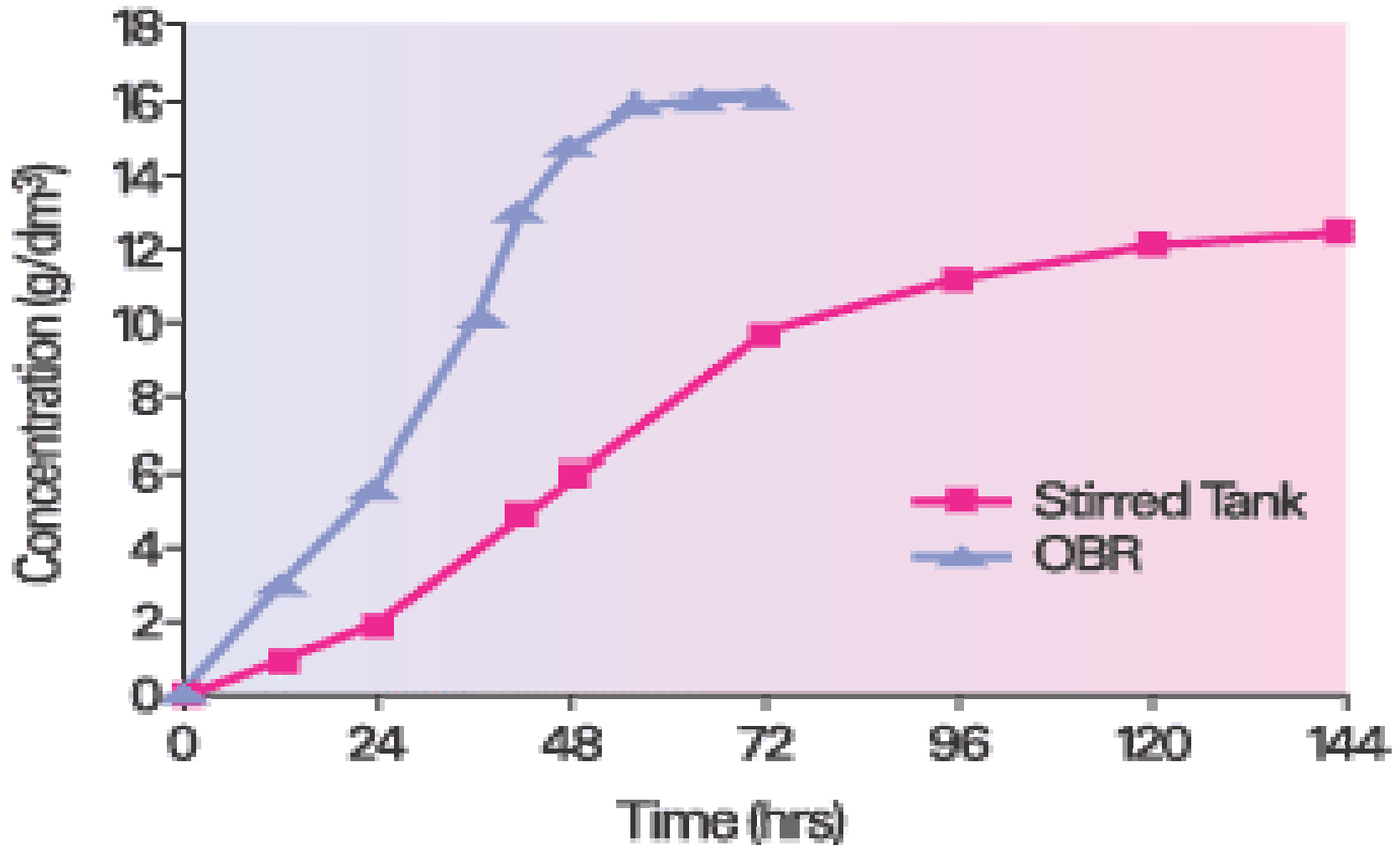


COBR : Key Features

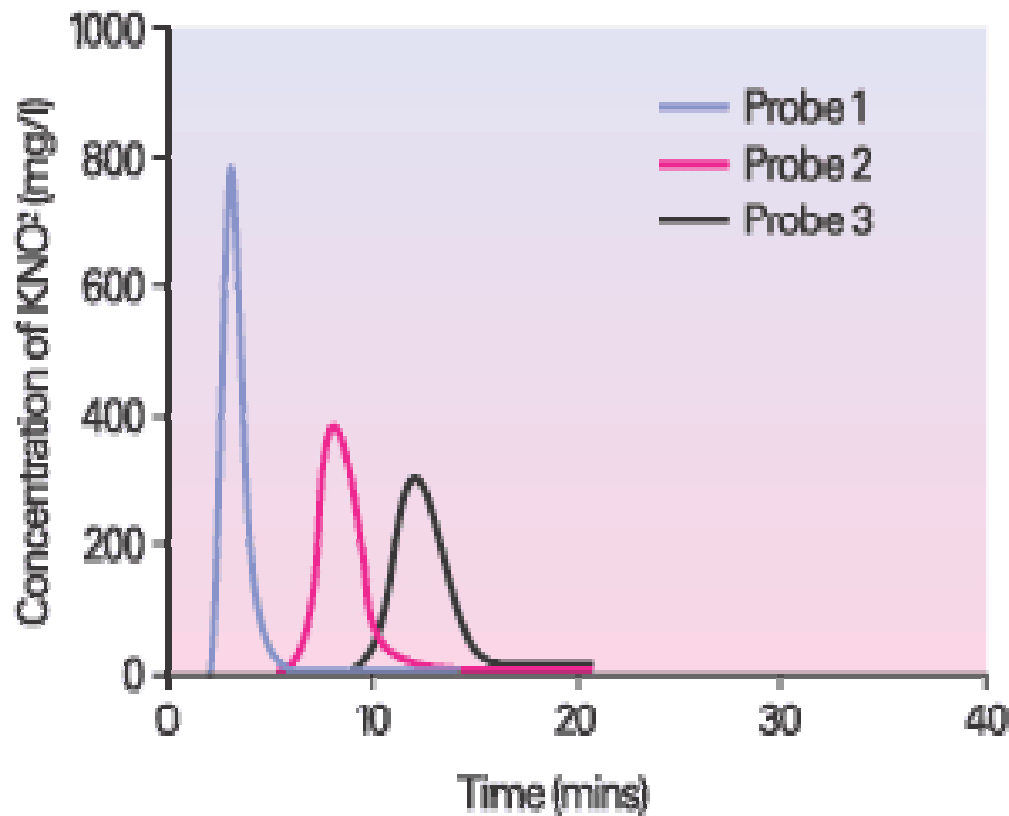
- Batch to Continuous
- Mass Transfer
- Heat Transfer
- Plug Flow
- Solids Suspension



Improved Mass Transfer



COBR : Plug Flow



Probe 1 = 3.7m

Probe 2 = 7.9m

Probe 3 = 10.1m



COBR : Key Features

- Consistency



- Reproducibility



COBR Story

OBR PROJECT RESULTS

HPLC Data for batch hydrogenation of aromatic nitroso compound

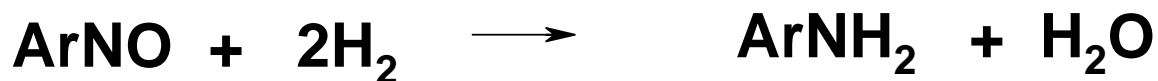


Table 1: Kinetic Study showing batch conversion of Nitroso to Amine vs time

Time/minutes	ArNH ₂ (%)	ArNO/ (%)	
15	35.2	64.8	
30	59.8	40.2	
45	77.8	22.2	
60	91.7	8.3	
75 (batch complete)	99.6	Not detected	



COBR Story

Data for continuous hydrogenation

Table 2: Typical results for continuous hydrogenation of an aromatic nitroso to amine

Run Number	1	2	3	4	5	6	7
Time in continuous mode/minutes	-	360	240	180	240	160	120
Number of elutions	-	12	12	12	12	8	12
Weight screened solution/g	-	5288	4783	5120	4817	3129	3532
Weight product returned/g	-	1308	1221	1339	1232	803	854
Weight yield/%	-	73	76	78	76	76	72
Assay/%	-	100. 1	99.1	98.5	100. 4	99.8	99.0
Purity%	-	>99. 9	>99. 9	>99. 9	>99. 9	>99. 9	>99. 9
Indicated product yield/day	-	5.2	7.3	10.7	7.4	7.1	10.2

The table above shows that when operating in continuous mode the reactor produced consistent yields and quality in both assay and purity.



Cleaning :

- Quicker
- Easier
- Cheaper





Cleaning :

Less Solvent:



STR



COBR



GREENER!!!





SAFER!!!



STR



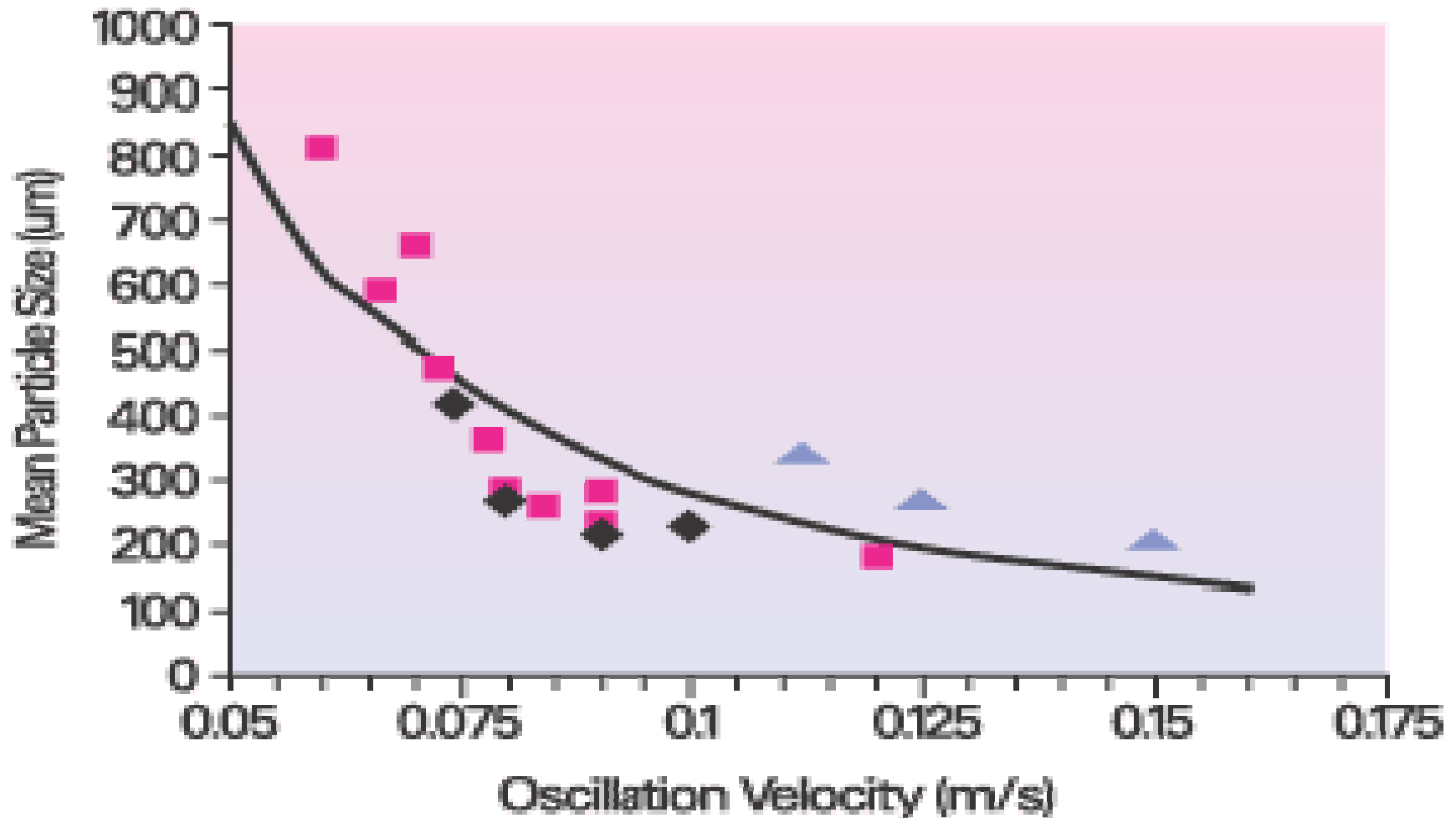
COBR



cpi ...the future inspired



Control of Crystallisation





Crystallisation :



STR



COBR









Other Projects:

- Spinning Disc Reactor
- Structured Reactor



$$N = \frac{(41.5 + a \operatorname{Re}_n - b \operatorname{Re}_n^2)}{1.36} \left\{ \left[\left(\psi + 1.8 - c \operatorname{Re}_n^{-d} \right) + 1 \right] e^{-0.35 \left(\psi + 1.8 - c \operatorname{Re}_n^{-d} \right)} \right\} + 1$$



Thank you.....



.....developing new ways to make things