



# From Washcoat Formulations to Inks

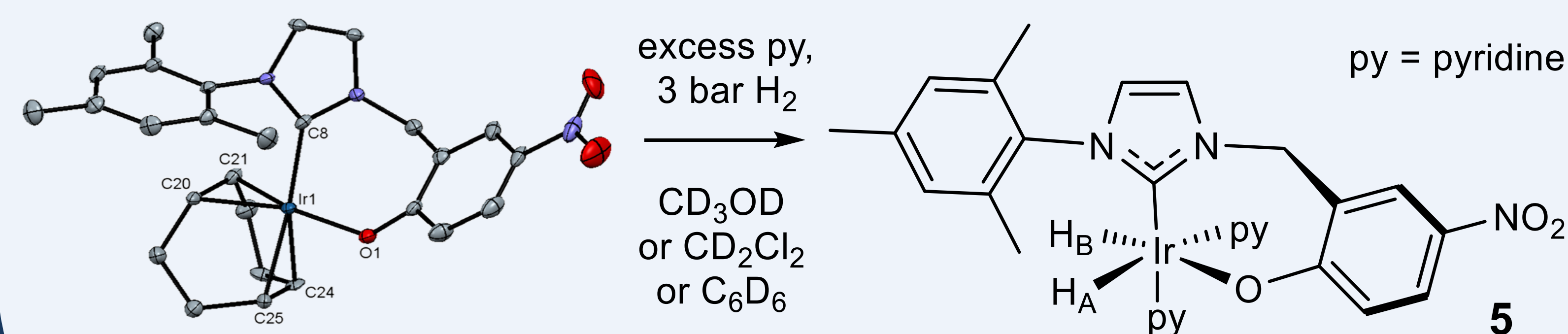
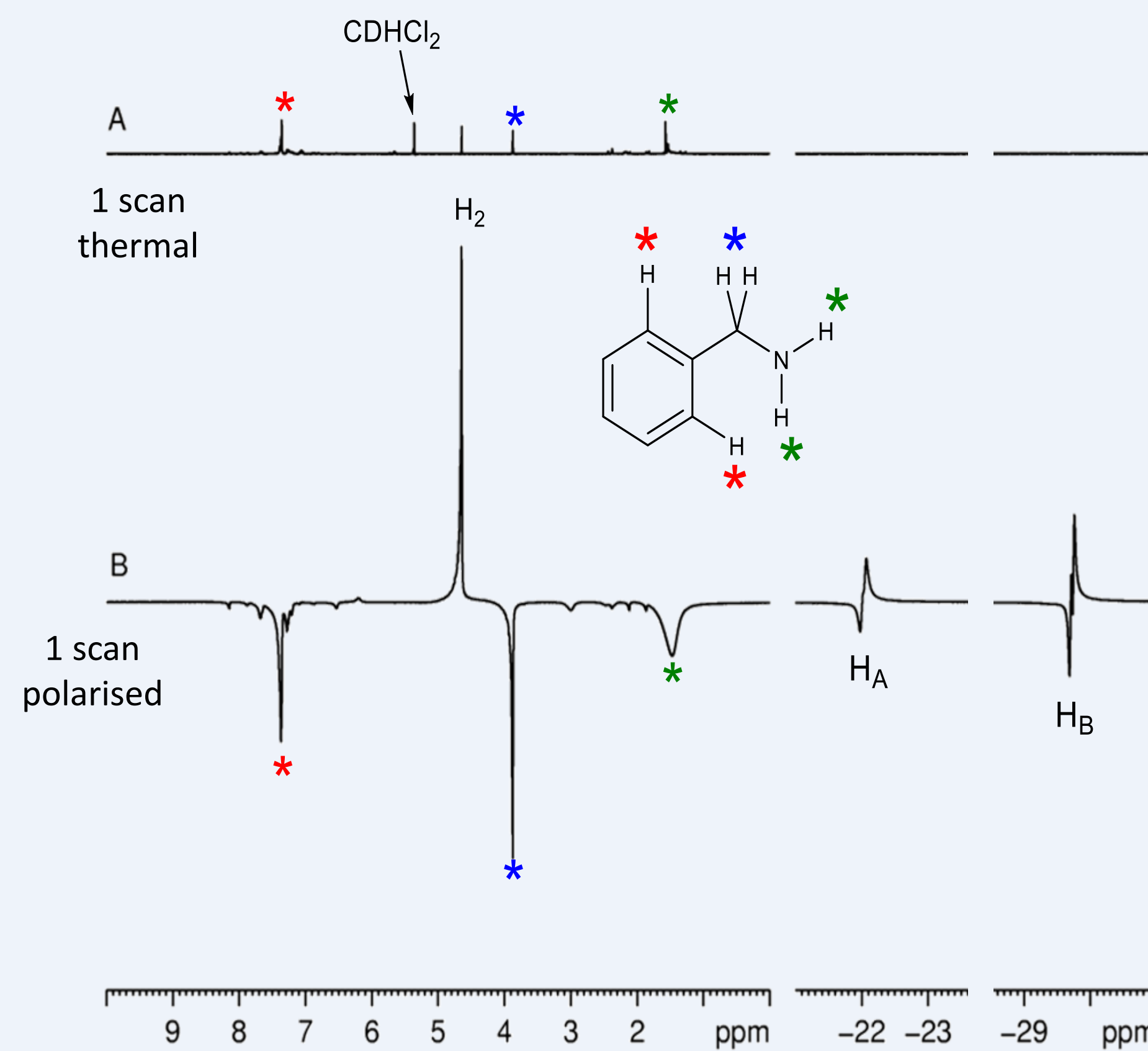
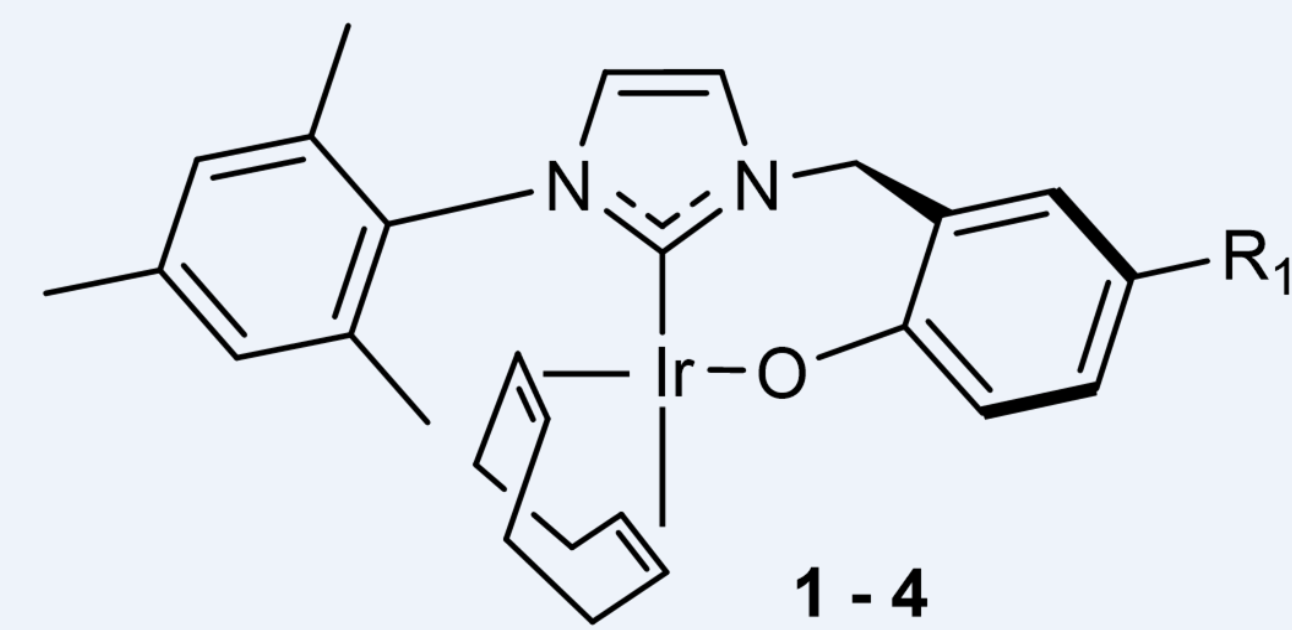
Dr Amy J Ruddlesden MChem CChem MRSC

## Introduction

- MChem in chemistry at the University of York
- Year in industry at F. Hoffmann-La Roche Ltd in Switzerland
- PhD in inorganic chemistry at the University of York
- Process Development Chemist at Johnson Matthey
- Ink Development Chemist at Linx Printing Technologies Ltd

## THE UNIVERSITY of York

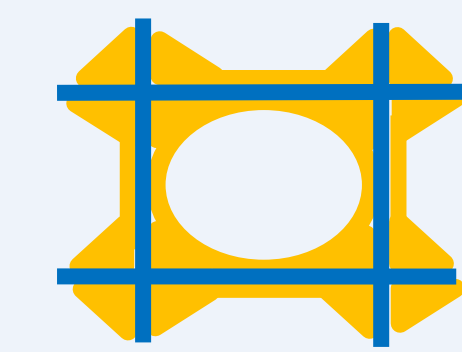
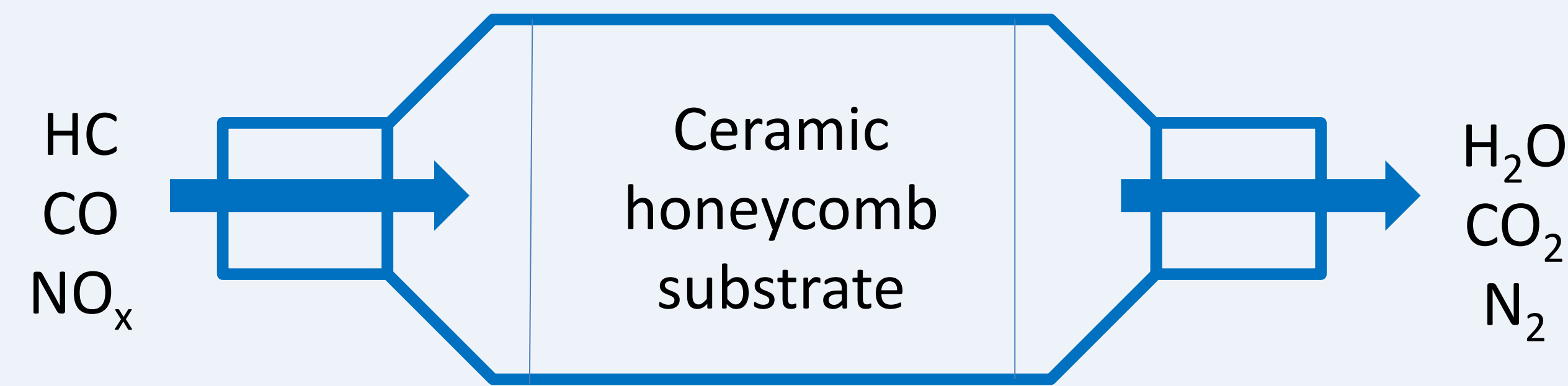
- PhD at the Centre for Hyperpolarisation in Magnetic Resonance
- Design and synthesis of iridium carbene catalysts
- Polarisation transfer reactions with *para*-hydrogen and substrates in solution and analysing reaction products by NMR
- Use of *para*-hydrogen gives enhanced NMR signals



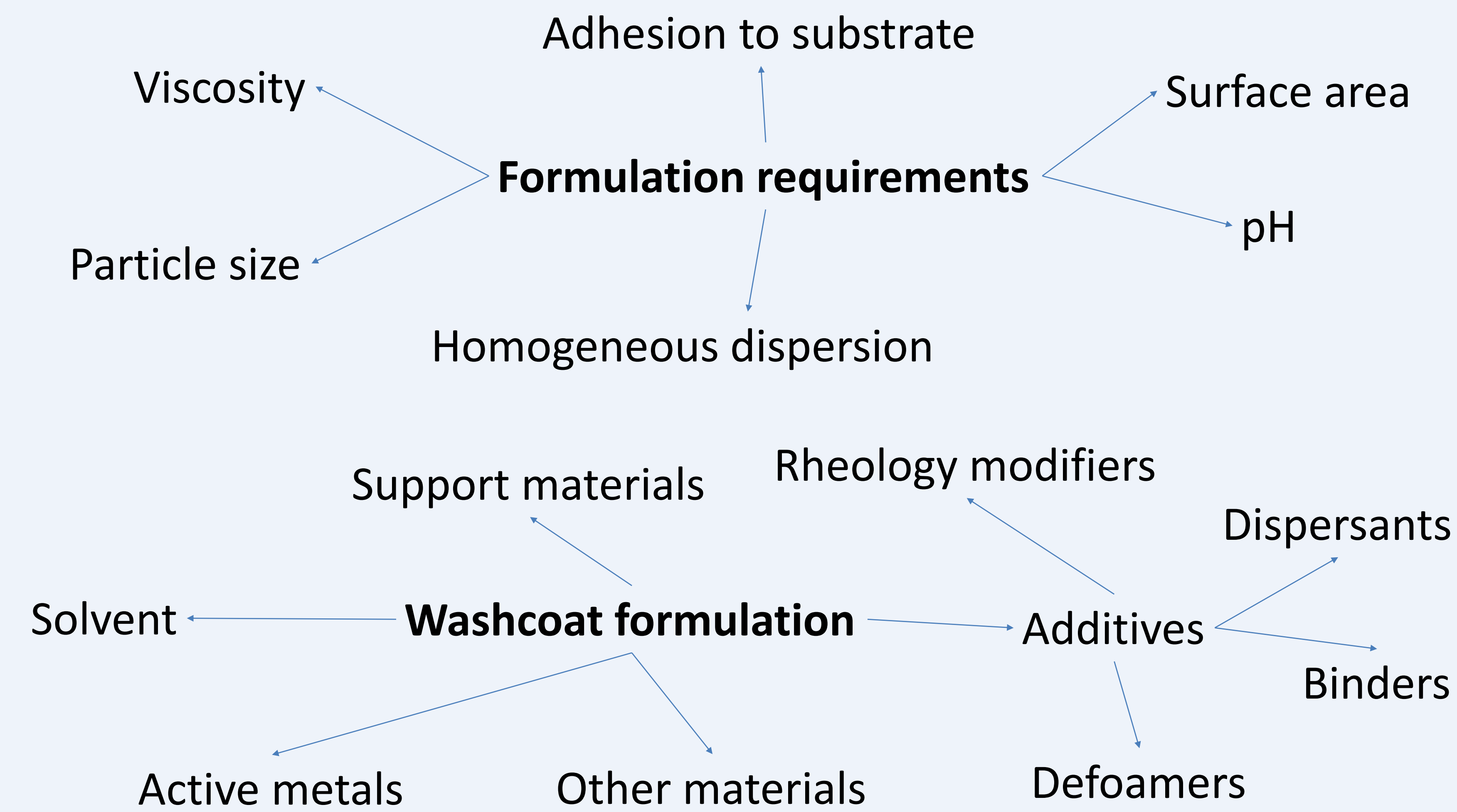
References: Ruddlesden, A. J. et al, *Organometallics* **2015**, *34*, 2997  
 Acknowledgements: Simon Duckett, Ryan Mewis, CHyM group, EPSRC



- Process Development Chemist in Clean Air
- Scale-up of heterogeneous catalytic convertor formulations
- Formulation transfer to global manufacturing sites
- Lead production support contact for Asian manufacturing sites



= washcoat coating all the channel walls

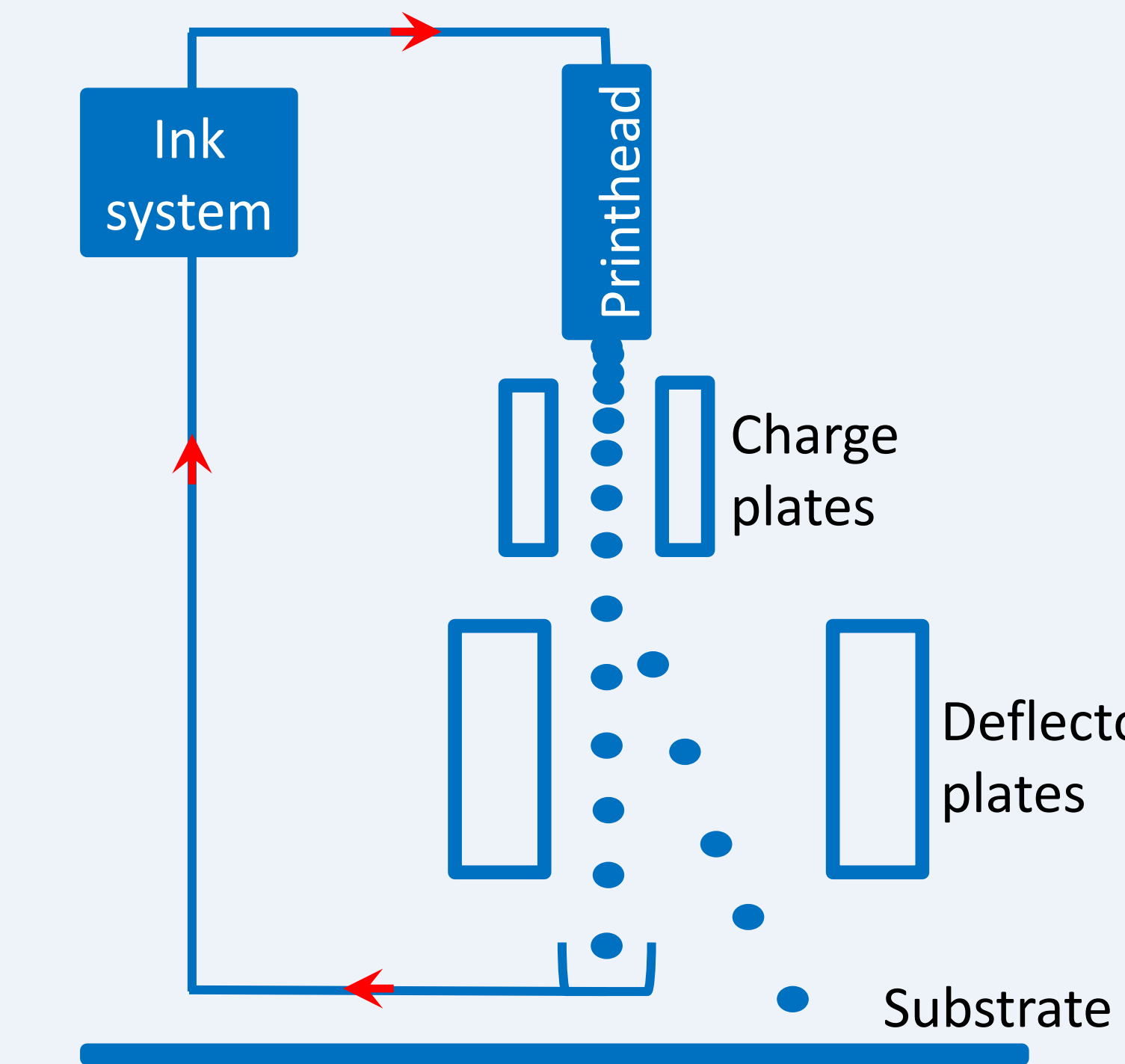


- Ensure formulation is stable in manufacturing
  - Plant trials to determine large scale batching capability
  - Monitoring of properties during batching
  - Analysing stability over time and response to mixing
- Problem solving process for existing manufacturing challenges
  - Formulation issues
  - Performance issues

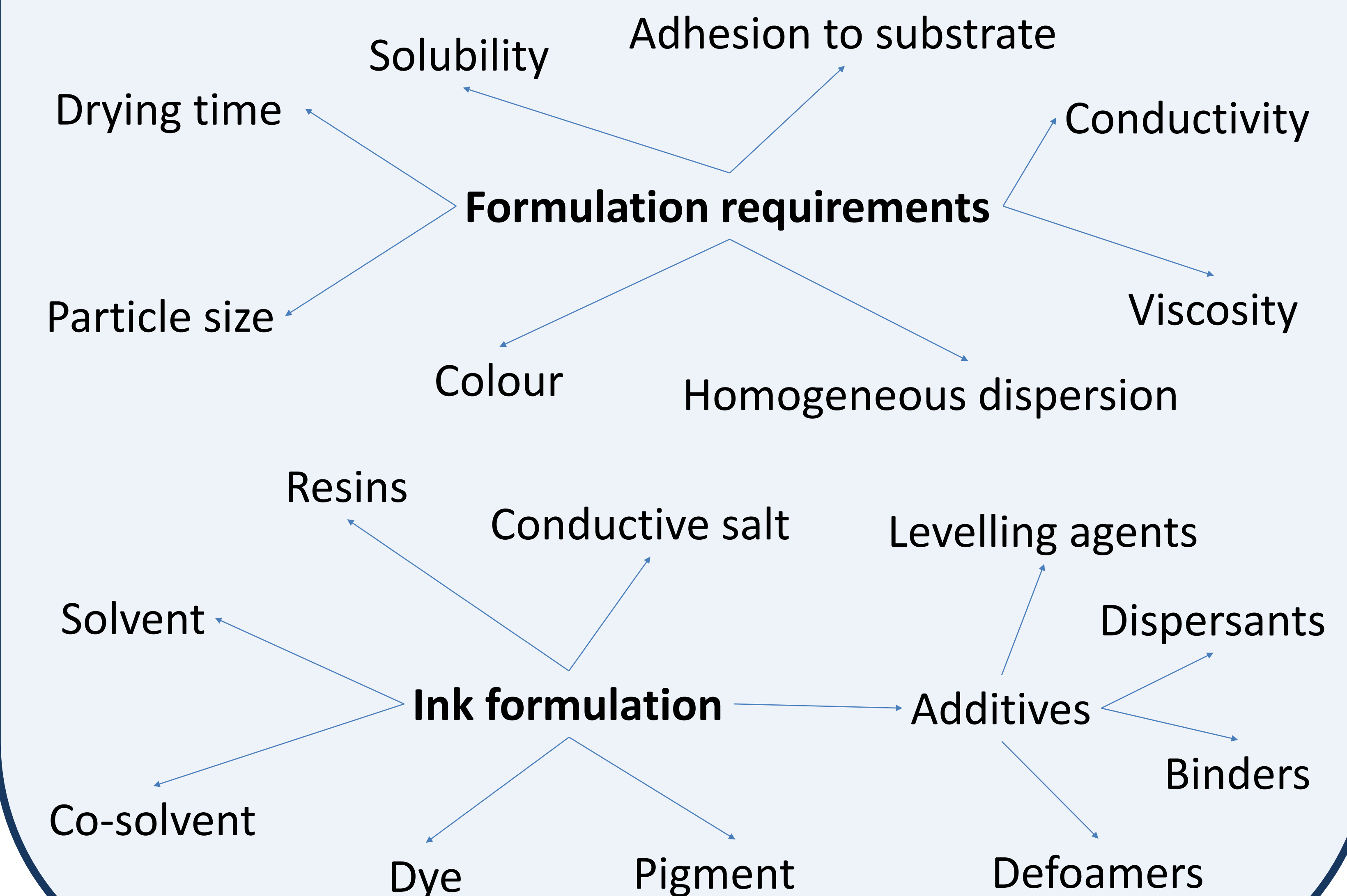
Acknowledgements: Chris Hanning, Sadia Shahid, Patricia Leyva-Bailen



- Ink Development Chemist for Continuous Inkjet Printing
- New product development of ink formulations
- Reformulation of existing ink ranges



- Ink droplets given a variable charge depending on where they need to be printed
- Deflector plates deflect charged droplets
- Uncharged droplets are continually recirculated
- No ink is wasted
- Deflected droplets dry on substrate surface to give printed message



Acknowledgements: Richard Marsden

## Future

- Regulations for UK REACH
- CMR (carcinogenic, mutagenic, reprotoxic) free formulations
- 'Green' formulations
- Inks with improved adhesion and faster drying times