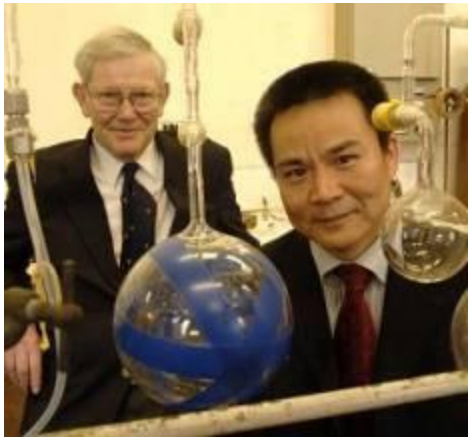
The Oxford Catalysts Story

Academic Background

- Prof Malcolm Green
  - Joined Department of Chemistry at Oxford in 1963
  - 1975 First catalysis paper published
  - 1987 Fundamental advances on partial oxidation catalysis (published in Nature 1990)



- Dr Tiancun Xiao
  - Visiting professor Beijing University of Chemical Engineering
  - Joined Oxford Chemistry's Wolfson Catalysis Centre 1999
  - Royal Society BP Aramco Research Fellow

The Invention

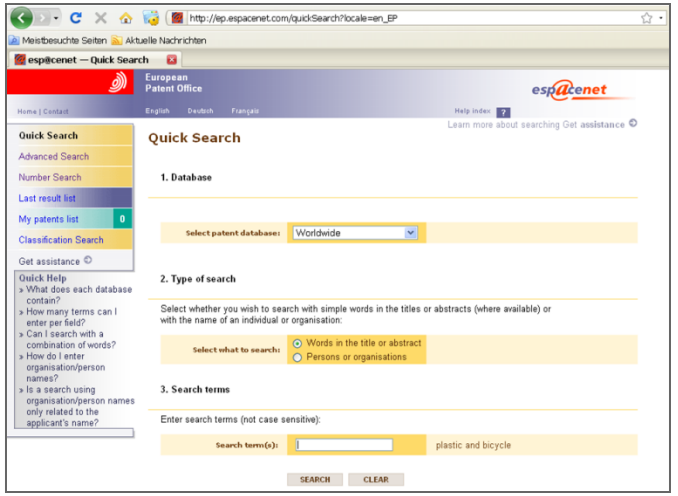
- In the year 2000, Tiancun manufactured catalysts that were:
  - cheaper than existing catalysts
  - delivered the same high levels of performance
- Malcolm and Tiancun now needed to decide what to do next
- They approached the technology transfer company for the University of Oxford

Taking an Idea Out of the Laboratory

- The University of Oxford owns any Intellectual Property (IP) created in its laboratories
  - The academic founders share in any *financial returns*
- Isis Innovation is the technology transfer company for the University
  - The academic inventors approach Isis with an *invention disclosure*
  - They work with a project manager to *patent and market* the idea, making use of commercial and investor networks to commercialise the technology
- To achieve this goal there needs to be:
  - A desire to commercialise the technology
  - A supporting infrastructure
  - The financial resources to develop the idea
  - A route to market

Could a Patent be Filed?

- Did the invention meet basic patent requirements?
  - novel
  - inventive
  - industrial application
  - permitted
- Did the University have the rights to own the invention?
- Prior Art searches



Did it Make Sense to File a Patent?

- The invention passed all the tests to apply for a valid patent, but would this make financial sense?
- Initial market due diligence:
  - Was there a need for this technology?
  - Did the team think it could make a profit?
- Was now the right time to file a patent?
- What about “freedom to operate”?
- The decision was made to file an initial patent in the UK

First Patent Filed - 2001

- Patent Application filed 28th June 2001

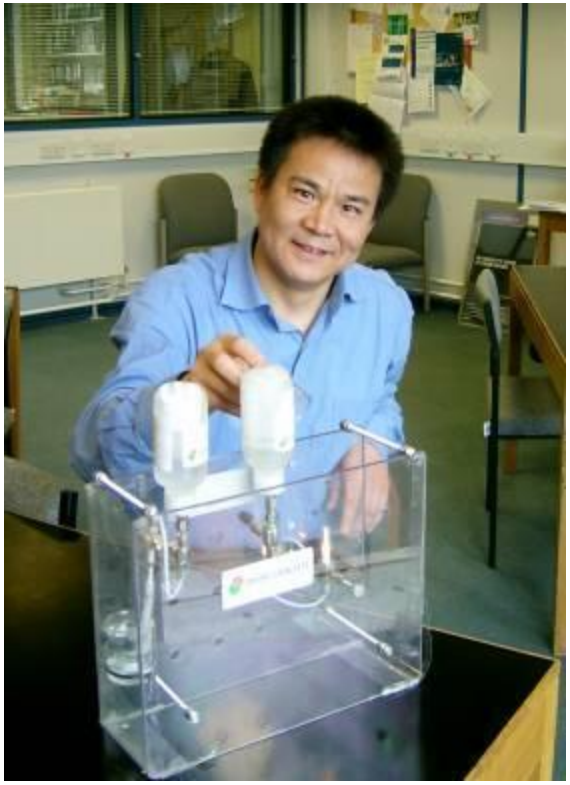
  - Application No: GB0115850
  - Applicant: Isis Innovation Ltd
  - Inventors: Malcolm Green, Tiancun Xiao

- The technology transfer manager worked with Malcolm and Tiancun to supply the patent agent with the information needed to draft the patent

- A patent agent will draft the claims in a patent to claim a much as possible

Early Stage Funding – Proof-of-Concept

- Xiao and Green awarded £124,500 in June 2001
  - Led to equity in Oxford Catalysts Ltd in Dec 2005
  - Patent 2
  - Significant value back to fund
- Business Development Fellowship
  - Funded Dr Xiao 2003-2004
  - Patent 3
  - Without it – no Dr Xiao and no spin-out!
- Proof of concept award September 2004
  - £24,500 for building a prototype
  - “Invaluable for showing to potential investors”
  - Patent 4



Where To Now?

- A decision needed to be made in early 2004
  - License the technology to an existing company, or form a spinout company?
- Two patents related to the petrochemical industry, two related to the emerging fuel cell sector
  - Significant investment was needed
  - An entrepreneurial approach was needed for the fuel cell sector
  - Chemical industry experience was needed for the petrochemical sector
- There was a potential loss of value if the IP was split up, but a potential loss of focus if it was kept together
- Tiancun was also keen to keep working on the technology
- The decision was taken to “spin out” a new company

Forming a Spinout Company (October 2004)

- There are many challenges when starting a new company
- First a management team needs to be brought together
- Tiancun and Malcolm were joined first by Will Barton and later by Roy Lipski
- Business Plan is continuously refined
- Investors ask many questions about the patents

- The inventors are involved in explaining the science to investors, and helping to paint a vision for the future

Funding to Move Forward

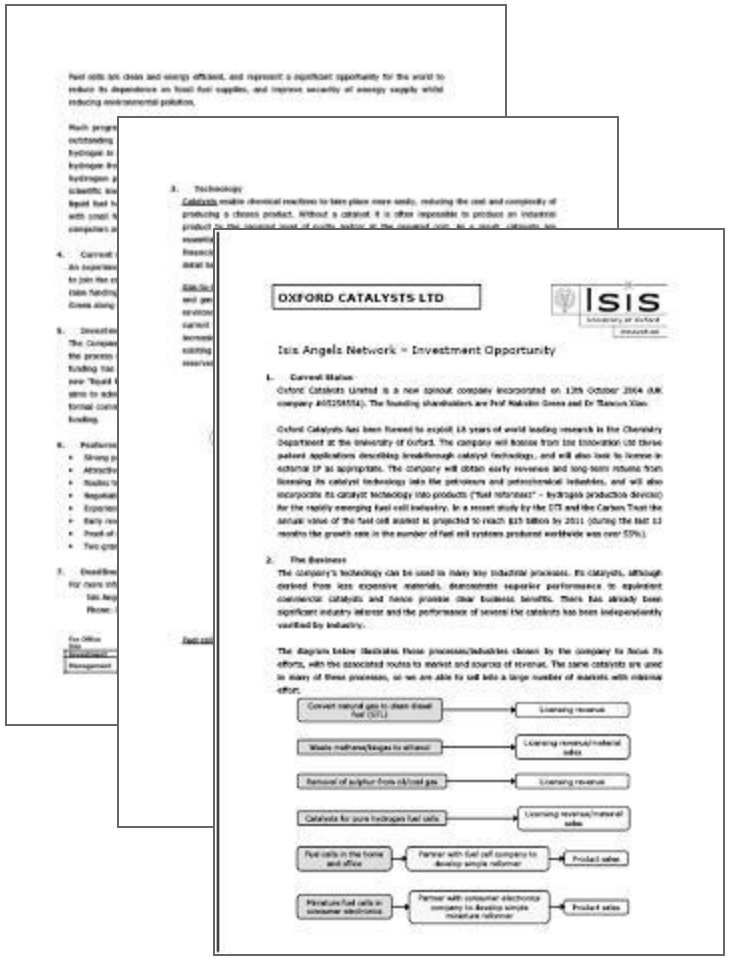
Investment briefing sent to ca. 100 business angels

Many venture capitalists contacted

Isis Angels Network investor presentation

Presented at Libraries House/Carbon Trust event

Presented at Venturefest
won the elevator pitch competition, the first £1000 for the company



The Initial Proposal

- Targets for the business
- Capital required
  - £500,000 to £1.5m sought
  - More => too much dilution
  - Less => insufficient funds to get off the ground
- Offer to investors:

  Investment of £1.3m at a valuation of £2.7m
- Very difficult to put a value on a brand new company
  - No sales, assets, track record…
  - Net present value calculations need so many assumptions they are meaningless

Doing the “Deal”

- Management, management, management
- Corporate finance or ‘deal-doing’ skills
- A flexible approach
- Maintaining trust
- Managing
  - Investors
  - Founders
  - Customers
  - Spin-out management
  - Lawyers, patent attorneys, etc

NEW OXFORD SPIN-OUT TO CATALYSE A CLEANER FUTURE

OXFORD CATALYSTS LTD

The latest spin-out company from Isis Innovation and the University, Oxford Catalysts Ltd, plans to develop and exploit novel catalytic technology for the energy industry which is both cost-effective and environmentally friendly.

Oxford Catalysts, the forty-ninth company spun out by Isis Innovation since 1997, develops catalyst technology for the petroleum refining and petrochemical industry, selected areas of the fuel cell industry and the processing of waste biogas.

The company is based on technology which has been developed over 10 years at Oxford by Dr Tiancun Xiao, of the Wolfson Catalysis Centre, the Chemistry Department and Professor Malcolm Green, of the Inorganic Chemistry Department. Both founders have world-wide reputations in catalysis science. Isis Innovation holds a series of patent applications on the intellectual property rights and has licensed them to the Company.

The founders have developed catalysts that can be used to transform waste methane, natural gas or coal into hydrogen for use with fuel cells, or into pure liquid fuels that can be used for engines or heating and are easy to transport. Further applications include the partial oxidation of natural gas and removal of sulphur from crude oil. The basis of the technology is an innovative method for catalyst preparation, which gives catalysts that are extremely active, selective and long lasting.

In April 2005 Dr Xiao won a Carbon Trust Innovation Award (Isis Newsletter summer 2005) for the development of technology that will help to exploit the commercial potential of methane, transforming waste methane into useful products. 'There are many sources of waste methane, ranging from agricultural waste and landfill to flare-off from oil production,' said Dr Xiao. 'Capturing the methane is important not only due to its high energetic value, but also because it is a very powerful greenhouse gas – 22 times worse than carbon dioxide – and its presence in the atmosphere contributes to global warming.'

Oxford Catalysts will also exploit catalyst technology that produces hydrogen from a liquid fuel containing methanol, starting from room temperature. This exciting technology is capable of being miniaturised for portable fuel cell applications and has received significant commercial interest already.

In preparing to spin out Oxford Catalysts, Isis Innovation was greatly supported by Oxford University's Begbroke Science Park, which runs the Oxford Enterprise Fellowship programme. The programme awarded a Technology Enterprise Fellowship to Dr Xiao which allowed him to concentrate for a year on developing the technology and commercial interest.

Dr Tiancun Xiao, of the Wolfson Catalysis Centre, the Chemistry Department

Professor Peter Dobson, Academic Director of Begbroke Science Park and the Enterprise Fellowship programme, said: 'Enabling successes like this is what the Begbroke Enterprise Fellowship is all about. We're very proud of what has been achieved by Dr Xiao and the other Enterprise Fellows and are looking forward to be able to help others in the future.'

The investment round of £500,000 was led by IP2IPO Group plc with additional investment from Top Technology Ventures, IP2IPO's venture capital fund management subsidiary. Isis Innovation and IP2IPO worked in close partnership to prepare Oxford Catalysts for investment. Dave Norwood, IP2IPO's Chief Executive, said: 'Oxford Catalysts represents a very exciting investment for IP2IPO with ground-breaking technology which has the potential to make a significant impact in both increasing fuel efficiency in the petroleum and petrochemical industry and supplying catalysts to the growing waste biogas and fuel cell industries.'

Tim Cook, the Managing Director of Isis Innovation, said 'Technologies which Oxford Catalyst offers have a very wide application, and will lead to huge energy economies. We look forward to a successful future for the company'.

CONTACT

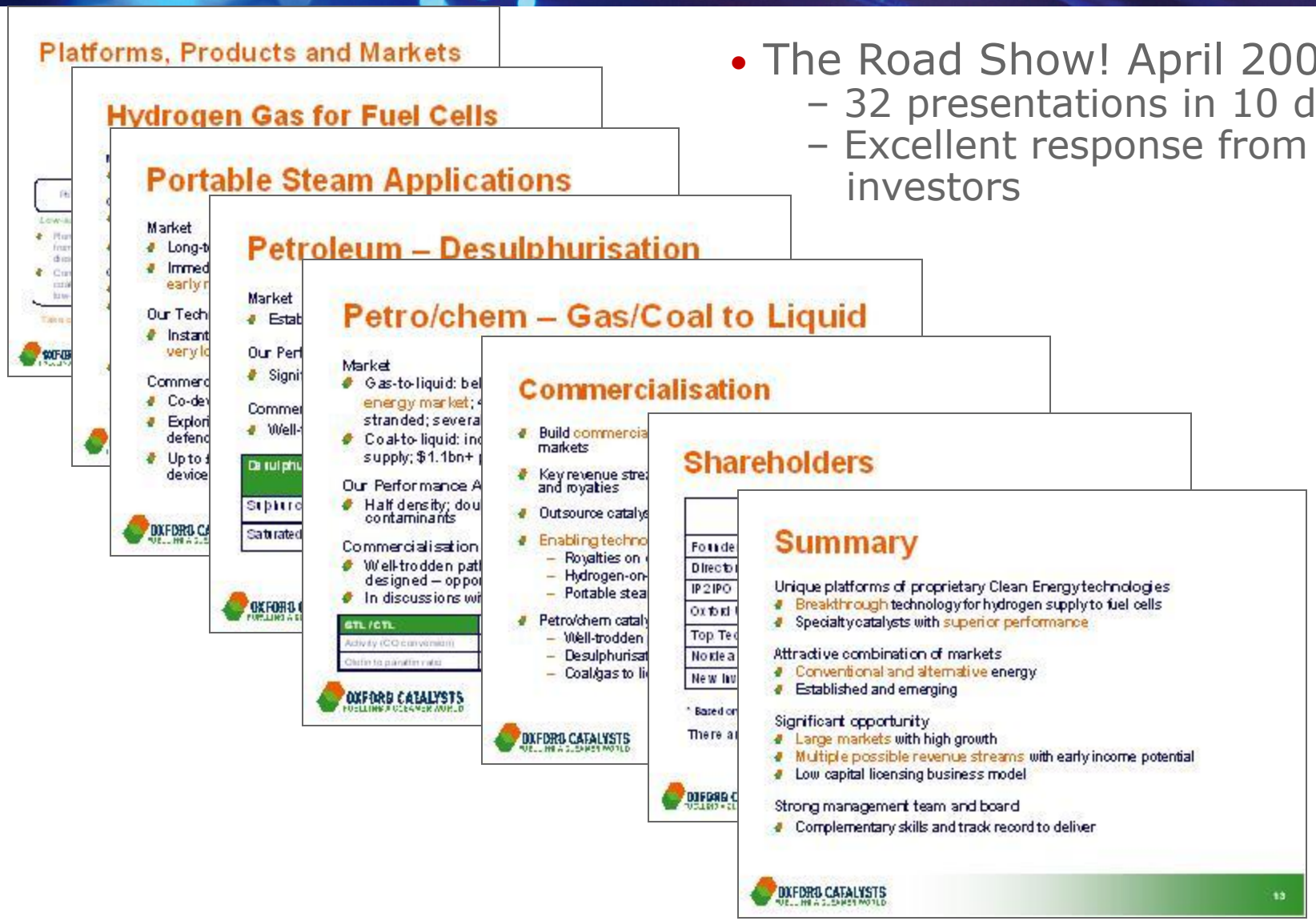
Dr Mairi Gibbs, Project Manager, Physical Sciences Group
T +44 (0)1865 280852
E mairi.gibbs@isis.ox.ac.uk
W www.isis-innovation.com

£500k first round funding

What next?

Picking up the Pace

- Within 2 months of seed investment, decision to go for Initial Public Offering (IPO)
  - Cost of £120,000 to abort
  - Very favourable market conditions
  - Development of Board, new members
  - Much work in a short timeframe
- The pros and cons of flotation
  - Rapid route to significant finance, avoids tyranny of annual investment rounds
  - Puts a very young company in the public eye
- Further negotiations
  - Pressure on terms of the Isis licence



- The Road Show! April 2006
  - 32 presentations in 10 days
  - Excellent response from investors

Oxford Catalysts Now

- Publicly listed company on the London AIM market
- Raised approximately £30 million in funding to date
- Acquired *Velocys Inc* in Nov 2008
- Combined company has approximately 90 employees

Lessons

- Patience and belief
- Invest seed money carefully but don’t be afraid
- Problems will arise – look flexibly for solutions
- Inventors must provide the driving force
- Technology transfer can keep the project on track

Oxford Catalysts Timeline

1999		Dr Tiancun Xiao joins Chemistry Department, Wolfson Catalysis Centre
2001		Researchers approach Isis Innovation – First patent filed
		University Challenge Seed Fund award £124,500 to finance Dr Xiao
2003		Commercial discussions begun with major petro-chemical companies
2004	June	Oxford Catalysts wins Elevator Pitch - Venturefest Business Plan competition
	Sept	Proof of Concept award (£25k) for bench top demonstrator
	Dec	Dr Will Barton retained as potential manager of NewCo
2005	Jan	Investment presentations begin
	March	Isis Angels Network investor presentations
	May	Investment syndicate forming
	Sept	Lead consortium makes investment offer
	Nov	Introduction of Roy Lipski to team
	Dec	Investment of £500,000 and launch of spin-out
2006	Feb	Decision to float on AIM stock market
	Apr	AIM float: £15m raised at total post-money valuation of £65m
	Oct	14 employees, new offices and laboratory
2007	Jul	£4m new investment through new shares placing
	Dec	25 employees, 7 different nationalities
2008	Jan	Expansion of lab and office facilities (doubled)
	Mar	State-of-art high-throughput catalyst screening reactors delivered
	Nov	£10m investment raised to allow acquisition of *Velocys Inc* ($35m part cash, part shares) and to provide further working capital

Total of 90 employees based in the UK and US