



## Preface

## Notes of appreciation

**David Trimm's first Ph.D. Student**

I first met David in 1969 when I went to Imperial College in London to get advice on how to spend a travel grant. He immediately took it that I wanted to study for a Ph.D. with him. He was so persuasive that I became his first Ph.D. student. I will never forget the first day at Imperial when he invited me into his office and with a glint in his eye asked me why I wanted to be at Imperial. I told him it was to get a Ph.D. to further my career at Johnson Matthey. He told me in no uncertain terms I was wrong and that I was there to learn how to do RESEARCH!

He was right of course. What I learnt from David was to help me be successful in the rest of my career. He counselled me while I was working for Johnson Matthey. We worked together in Norway for 3 years when I was a researcher at SINTEF being supervised by David. I learnt more about catalysis in those three years than in my previous ten. I moved from Norway to the USA when David moved to Australia, but we stayed in touch. In 2000, when I received the Honda Prize from Mrs. Honda, David flew from Australia to Japan to attend the ceremony. We were both introduced to Mrs. Honda and David was introduced as my Sensei. It could not have been a more fitting term. My wife and I have lost a long time friend and teacher. We will miss him.

**Barry Cooper**

**David Trimm at the University of New South Wales**

David and I became close friends from the time he took up his appointment as Professor of Chemical Technology at UNSW in February 1979. I had arrived at UNSW five years earlier as a lecturer in the School and established a small group in catalysis. A colleague commented at the time: "You must be very unhappy that David Trimm is coming to the School as he will take over from you and ruin your career." How wrong can someone be? He did not know David as did all his colleagues and friends. As Professor and Head of School, David assisted me and mentored me in my career. We collaborated in research, particularly on copper and vanadia catalysts where we had shared interests, while maintaining our own areas of research specialization. It was in the area of copper catalysts and copper catalysed reactions that David, Noel Cant and I had the most fun. We had great Ph.D. students and a number of outstanding Postdoctoral Fellows from ETH in Zurich working with us on those projects. David brought to the UNSW group his enormous international reputation and contacts and his relationship with Alfons Baiker at ETH was typical.

One of David's greatest attributes was his inclusiveness. That was what endeared him to people from all walks of life and from countries all around the world. He would frequently invite me to join him at conferences and workshops. He was a great traveller and a great travelling companion. We had many very special times together, including teaching a three week course on catalyst preparation and characterization in Buenos Aires, a two week seminar series for the Chinese Petroleum Company in Taiwan, along with numerous conferences, including International Congress on Catalysis meeting in Calgary and Baltimore. David would always introduce me to world leaders in catalysis at these meetings.

David's international standing in the Catalysis community attracted a constant stream of international visitors to the School and they, too, became lifelong friends of David so many of them made numerous return visits on a sabbatical leave or simply to have a vacation frequently staying at Watsons Bay with him and Gabi. Having held positions at universities in Chicago, London and Trondheim, David found his true home in Sydney. He immediately fell in love with Australia and its people. And within a microsecond of eligibility, he took out citizenship. Wherever he went in the world, he waxed lyrical about the Australian way of life and he probably did more for tourism in this country than have Paul Hogan and Elle McPherson combined.

Emeritus Scientia Professor David Lawrence Trimm, AM FTSE, leaves outstanding legacies in the field of catalysis and catalytic

processes and higher education. He also leaves all of us with great memories of this extraordinary man whom we admired and loved

- For being so sharing and caring
- For his great humour
- For his joy of life and
- For his unending love of Gabi.

It was my great fortune that David came to UNSW in 1979 and that we became such great friends.

**Mark Wainwright.**

#### **David Trimm in Trondheim**

After the discovery of oil and gas in the North Sea and with the establishment of a Norwegian petrochemical industry, the Norwegian University of Technology (NTH) decided to strengthen its activity in petrochemistry and catalysis. Two new positions were announced at NTH and David Trimm was appointed to one of them. He came to Trondheim from Imperial College, UK, as a full professor in 1976 and remained there for three years, leaving Trondheim in 1979 for a professorship at the University of New South Wales in Sydney, Australia. His successor in heterogeneous catalysis in Trondheim was Anders Holmen.

David Trimm made his contribution to teaching during his time in NTH with the establishment of a new course in heterogeneous catalysis for fourth year students and also produced an associated compendium on catalysis. During his stay in Trondheim, he wrote his book on the Design of Industrial Catalysts. (This was published in 1980 after David had moved to Sydney.) During his short stay in Trondheim, he also supervised a number of MSc students and developed close contacts with industry. Although he could not establish a Ph.D. programme, his contribution to research was important for the later Ph.D. programme in catalysis in Trondheim.

David's research work in Trondheim started with studies on the catalytic reforming of naphtha for the production of gasoline and, in particular, on carbon formation from model compounds on supported Pt–Re catalysts. He followed up this work with an examination of carbon formation on Ni catalysts and on steel surfaces. Much of this research involved the use of microbalances for the direct measurement of carbon formation. David was also involved in establishing a reactor system controlled by a computer as early as 1978/1979.

Although David Trimm spent only a short time in Trondheim, his ideas, in particular his focus on fundamental research as well as on international co-operation, was important for the establishment of a large catalytic group in NTH. Catalytic reforming and carbon formation are still important topics in Trondheim!

**Anders Holmen**

#### **David Trimm in Japan**

I first knew David's name about 30 years ago as regional editor for Applied Catalysis and his name had been well known through his ambitious book entitled Design of Industrial Catalysts.

I had an opportunity to visit a university overseas and selected the University of New South Wales in Sydney rather than the other universities because David had invited me eagerly. I worked at the School of Chemical Engineering and Industrial Chemistry of the University of New South Wales from 1988 for one year as a visiting professor. After we came back to Japan, we visited Sydney several times and enjoyed the hospitality at Watsons Bay.

David stayed at our house in Utsunomiya several times. When David stayed with us we were often awakened by a big sound and a cry that David made in the morning! He was too tall in our Japanese size house. So we had to hang a ribbon in each doorway lest he should hit his forehead. In the end we attached our two

beds together and he slept diagonally. He was like a big boy in the Gulliver's Travels.

Last December (2010) we were waiting for his Christmas card and were preparing how to write our card to him. We had to think a lot in order to write good English with jokes as he was our great teacher of jokes.

**Hideaki Muraki**

#### **David Trimm**

I met David first when he was still at Imperial College in London at which he regularly arranged significant scientific meetings, the most notable being the Sixth International Congress of Catalysis held in 1976 (for which he was the main local organiser). We got to know one another particularly well because of our work on steam reforming catalysis and I became an admirer of his work, with Jens Rostrup Nielsen and others, on carbon deposition on nickel catalysts. I was privileged to have been the External Examiner for the very significant Ph.D. theses of both Carlos Barnardo and Jose Figueiredo who have contributed, together with Luis Lobo, another former student of David, an important paper to this issue.

At the end of the 1970s, following suggestions from Bernard Delmon and others, Elsevier agreed to launch Applied Catalysis. By then, David had moved to Australia and Bernard asked him to become Editor for the Far East. At the same time, he asked me to take on the Editorship of News Brief, an important feature not only of Applied Catalysis but also of my own life for the next 15 years or so. David became one of my regular correspondents and I still have clearly in my mind a description of himself crawling around under automobiles smelling the hydrogen sulfide emissions produced by the then current generation of exhaust catalysts. From his position in Sydney, David also became our "Guru" on "Who and What" of the Far East and it was through him that I was able to acquire many more contributions for News Brief from the region. On top of that, he helped establish Applied Catalysis first in Japan, then in China and Korea and, more recently, in other Asian countries.

I met up with David on many occasions over the last 30 years, often in Elsevier editorial meetings at venues throughout the world but also at the meetings of the Natural Gas Conversion Symposium Board. I frequently also used David as adviser on other matters and he gave very freely of his time. For example, he put me in touch with Makoto Misono, who became the first Asian Associate Editor of Catalysis Today; he also acted as referee for me in connection with a couple of important issues; and he also occasionally provided me with very astute opinions on general academic matters outside the field of catalysis.

David Trimm was a good friend and colleague for more than 30 years and I will greatly miss his advice as well as his unfailing charm and humour.

**Julian Ross**

#### **38 years. My friendship with David**

David and I met at the International Congress of Catalysis at Palm Beach in 1972. We were doing research in the same field and with the same approach. He was one of the pioneers in studying and explaining the mechanism of carbon formation on metal catalysts and I was carrying out similar studies related to the steam reforming process. We had both been impressed by the work of Terry Baker but agreed that his temperature gradient driven mechanism for growth of whisker carbon (carbon nanotubes) could not be true and we decided to support each other in work on the subject and to publish together.

David and I had the same attitude not only to science but also to most aspects of life. This was the basis of a lasting friendship. He often invited me to Imperial College where I was introduced to my "competitors" from ICI (Dennis Dowden and Sid Andrew). Since then, David and I met almost yearly, at different locations around

the world, not the least of these meeting places being Australia where I was introduced to his close friends, Mark Wainwright and Noel Cant.

When David moved to Australia, his former Portuguese Ph.D. students (Carlos Bernardo and Jose Figueiredo) contacted me and asked me to become involved with their work since their “father” had moved far away. This resulted in close contacts between us, leading to a lasting friendship since. Bernardo spent a period as a postdoc at Haldor Topsoe and we later hosted his Ph.D. student, Teresa Tavares. We also later had a collaboration with another of David’s Ph.D. students, I. Ul-Haque, who was working at UNSW on the promotion of steam reforming catalysts.

A special event took place in a small hotel room in New Plymouth, New Zealand, in April 1987. This meeting took place following the Methane Conversion Symposium in Auckland arranged by Mobil and after a visit to their MTG plant a group of people met, around a bottle of whisky and fish and chips, to celebrate David’s 50th birthday; this group included David, Graham Hutchings, Duncan Seddon, several others and myself. We agreed to continue the same type of symposium, with contributions from both academia and industry, and this was the start of the Natural Gas Conversion Symposia (NGCS). Anders Holmen volunteered to arrange the next meeting in Oslo. Subsequent meetings in the NGCS series took place in Sydney, the Krüger Park and Sicily. It was all rather loosely organised by the founders, these now also including Domenico Sanfilippo, Theo Fleisch, Julian Ross and others. The NGCS was later to be more formally constituted by Theo Fleisch and Enrique Iglesia with subsequent meetings held in Alaska, Dalian, Brazil, and Lyon. The NGCS Award was introduced and it was fully deserved that David received this Award in 2007. Many of us met David for the last time at the meeting in Lyon in May 2010. The last message that I received from David was a postcard stamped two days after his death.

David was strict on scientific principles but had a great heart when dealing with people. He was an inspiring team leader and, with his sense of humour and his charm, he was able to create a strong worldwide network of friends. I was grateful to be part of his world.

#### **Jens Rostrup-Nielsen**



#### **David Lawrence Trimm – His thirty wonderful years in Australia**

David Trimm was a well-known (lofty) figure in the international catalysis community, not just for his height or research publications. He was a long-term participant in the growth of the journals, organisations and conferences devoted to catalysis, most

notably Applied Catalysis, the Asia-Pacific Catalysis Society and the Natural Gas Conversion Symposia. Through such linkages he made many close friends whom he invited to Australia. Many subsequently stayed with him and his partner, Gabi, in their home close to Sydney Harbour.

Here the concentration is on studies carried out during his thirty years in Australia with a preface describing his earlier career in Europe.

#### **Years prior to 1980**

David Trimm was born in England in 1937. He obtained first class Honours in chemistry, followed by a Ph.D. in 1961, at the University of Exeter, working under the supervision of R.J. Williams on the decomposition of hydrazoic acid [1]. He then spent one year with C.F. Cullis at Imperial College, London, on a BEIT fellowship followed by a year in Chicago with Jack Halpern. In 1963 he returned to Imperial College as an Assistant Lecturer in the Department of Chemical Engineering and Chemical Technology.

Most of his publications during his initial years at Imperial College were co-authored with Professor Cullis and concerned oxidation in the gas phase, the most cited of which is a paper in the Proceedings of the Royal Society in 1966 [2]. He gradually developed interests in a variety of heterogeneously-catalysed reactions, starting with methane oxidation (with D. Keene as student), hydrocarbon oxidation in general (with Dennis Brown, L. Doerr, N. Parera, I. Onsan and M. Goldwasser), catalytic combustion (with R. Holton, A. Busby and C. Turner), the restructuring of silver (with A.E. Presland and G.L. Price), carbon molecular sieves (with Barry Cooper) and, one of his lifelong interests, the deposition of carbon on metals. The latter studies were undertaken by a series of excellent students from what was then the Portuguese colony of Mozambique (Luis Lobo, Jose Figueiredo and Carlos Bernardo) with the participation of Frank Derbyshire and Alberto La Cava. Publications started with a well-known paper with Lobo in 1973 [3], now cited 101 times, and culminated in David’s single author review in 1977 [4] now with almost 300 citations, his second highest total. His interest in the deposition of carbon on nickel steam reforming catalysts paralleled that of Jens Rostrup-Nielsen of Haldor-Topsoe A/S, with whom he formed a life-long friendship and wrote a frequently-cited joint paper on the subject in 1977 [5].

David was Chairman, Local Affairs, for the very successful Sixth International Congress on Catalysis held in London in 1976. Towards the end of that year, frustrated by a then rigid promotion system, David left Imperial College to become the Foundation Professor of Petroleum Chemistry at NTH, the University of Trondheim, Norway, with the task of introducing undergraduate and postgraduate courses to train petroleum engineers and scientists. He later took a second role as research leader at SINTEF, the research arm of the University.

Towards the end of his period at Imperial College David had obtained funding from a variety of industry sources for work on coal conversion and hydrotreating and, most notably, from Rolls-Royce for the study of catalytic combustion. The experimental programs in these areas continued in London under his supervision and, in the area of hydrotreating that of Kerry Pratt, while a research group on steam reforming and steam cracking was being built in Norway. The work on catalytic combustion was carried out by C.W. Lam, with one of their joint papers now very well-known [6]. The area remained another of David’s lifetime interests and his 1983 single author review of the subject [7] is currently his most cited paper with 318 citations. One of the hydrotreating studies, carried out by Ricardo Badilla-Ohlbaum, was amongst the first to address the question as to which of the rings in benzothiophene and benzofuran needed to be hydrogenated first to facilitate removal of the heteroatom [8].

After three years in Trondheim, perhaps seeking warmer temperatures and lower taxation, David decided to move again. He was interviewed by several universities in the United States but chose instead to accept the Chair of Chemical Technology at the University of New South Wales (UNSW) on the opposite side of the globe from Norway.

### The 1980s

David arrived in Sydney in late 1979 with the designated duty of amalgamating two Schools, Chemical Engineering with Chemical Technology, and expanding research in the combined entity. He started this task while completing his book “Design of Industrial Catalysts”, which was published in the following year, and then taking on the role of Regional Editor for Applied Catalysis when the journal was started in 1981.

His arrival in the country took place at a time when the Australian Research Grants system was undergoing change from one of small year-by-year individual grants, intended to supplement funds allocated centrally to Universities, to one of larger three-year grants with a bias towards collaborative projects. A National Energy Council was also set up to provide funding for research, development and demonstration projects in the energy area and some Universities started to encourage staff to offer short courses to industry with the surplus available for travel. In typical fashion David took full advantage of these opportunities. He formed a team with Mark Wainwright, already established at UNSW, and Noel Cant, at Macquarie University, and obtained a series of continuing research grants. They also organised a number of short courses, most based around invited experts from overseas, in various areas of catalysis, especially in processes for converting coal and gas to liquid fuels and in catalytic methods for emission control. The latter were aided by liaison with Johnson-Matthey (Australia), which, later in the decade, set up a plant for the manufacture of catalytic converters in Sydney for supply to local vehicle manufacturers.

The team's largest research grant was for the investigation of a two-stage low temperature route for the conversion of synthesis gas to methanol. The first step was the base-catalysed reaction of carbon monoxide with methanol to form methyl formate followed by the hydrogenolysis of each molecule of methyl formate over a copper catalyst to yield two molecules of methanol, one then being recycled. Two talented Ph.D. students, Steve Tonner and John Evans, investigated catalysts for both steps, the first carried out in the liquid phase [9], the second in the gas phase. The potential for using a higher alcohol as the starting material in place of methanol was also examined but it proved problematic due to rapid transesterification processes [10]. Subsequent work, pursued by Daniel Monti, the first of a series of brilliant visiting post-doctoral fellows from Alfons Baiker's group at ETH in Zurich, showed that the second stage hydrogenolysis was better carried out in the liquid phase [11]. It was later shown by Wender's group in Pittsburgh that the two stages could be operated as a single step under some conditions and this approach has since seen further development in China.

The initial UNSW studies on the hydrogenolysis step, and on the reverse dehydrogenation of methanol to methyl formate and hydrogen [12], used commercial copper chromite catalysts and Raney copper catalysts then being investigated by Mark Wainwright for methanol synthesis by the standard route from synthesis gas. It was subsequently found that a pure copper-on-silica catalyst made by ion exchange [13] was equally active and this catalyst was subsequently used in mechanistic studies, which employed in situ infrared spectroscopy [14] and isotope tracing [15]. Later in the 1980s and into the 90s, the same preparation was investigated as a catalyst for many other reactions starting with the hydrolysis of acrylonitrile to acrylamide (carried out by Ph.D. student Jong Lee),

followed by the hydrogenolysis of diesters and acetates, and the hydrogenation of acetaldehyde.

In addition to the work on copper-based systems, David took part in the start-up of research in a variety of areas, some in conjunction with Mark Wainwright and/or Noel Cant, and others independently. This included work on the carburisation/oxidation of steels (with David Young), oxidation over vanadia-based catalysts (with Mike Kwan and Sooty Vorlow as students), catalytic combustion of methane and iso-octane (David Stirling), Ni-Mo and Ni-W hydrotreating catalysts (with Ashit Maitra) and the deactivation of Pt-Ir reforming catalysts (with Jorge Beltramini).

David stood down as Head of School in 1985, in conformity with a policy of rotation, which gave him more freedom for other activities. He undertook a study in 1986 for the State Pollution Control Commission on the causes of odour in the exhaust of motor vehicles after a political controversy when catalytic converters were first introduced [16]. He spent periods of time in Kuwait, from which arose a review on the control of pore size in alumina supports [17], with H.-G. Lintz in Germany, and commenced what was to become a long-term relationship and close friendship with the group of Young Gul Kim and Jae Sung Lee at Postech in South Korea. In 1988, the year of the 200th anniversary of European settlement in Australia, he organised the Bicentenary Catalysis Conference. In 1986 David was awarded the Erich Heymann Applied Research Medal of the Royal Australian Chemical Institute jointly with Mark Wainwright and Noel Cant.

### The 1990s

David was reappointed as Head of the School of Chemical Engineering and Industrial Chemistry in late 1989 and held the position until 1998. During this period he took part in many professional activities. He served on the Australia Korea Foundation from 1992 to 1999 and then became a board member on the Australia Korea Business Council. He was Chairman of the Organising Committee for the national chemical engineering conference (Chemeca) in Canberra in 1992 and again for the Third Natural Gas Conversion Symposium held in Sydney in 1993. He was a founding member of the Pacific Basin Catalysis Society in 1995, which led to the first Asia-Pacific Congress on Catalysis held in Kyongju, South Korea, in 1997. He was one of Australia's two delegates to the International Congress on Catalysis for the period 1992 to 2000.

In 1997 David received the Award of Excellence in Chemical Engineering and the Murphy Medal of the Royal Australian Chemical Institute, together with the title of Distinguished Fellow of the Institute, only four of whom had been appointed at the time. In 1998 David received the Order of Australia from the Commonwealth of Australia for services to the nation.

In terms of research, studies of the use of copper-based catalysis continued into the early 1990s, initially on the hydrogenation of alkynes (in the hands of Jurg Wehrli) and the hydrogenolysis of diesters (Daniel Thomas and then Thomas Turek, with whom a review was written [18]) and finally, the steam reforming of methanol (with student C.J. Jiang). The studies of methanol reforming were commenced before the surge of interest in the reaction for the production of hydrogen for use in fuel cells in vehicles and miniature devices. The research led to two well-known papers concerning the kinetics and mechanism of the reaction [19,20]. Another area of research which continued into the 1980s was studies of hydrotreating catalysts (with Esen Kural and Christine Mauchasse) leading to a review of the coking of such catalysts, which David co-wrote with collaborators from Kuwait [21].

Early in the 1990s David started a series of investigations into the operation of catalytic converters on automobiles. This was partly as result of continued liaison with Johnson Matthey in Australia,

which led to him being asked to undertake a confidential review of the company's research and development operations worldwide. The first of his studies in this area concerned the surface-area stability of alumina, which led to the development of a high-temperature stable variant produced by the direct decomposition of aluminium sulfate rather than aluminium hydroxide. The discovery was the subject of a patent application in 1992 [22]. This work was followed by studies of the stabilisation of aluminas by rare earth and alkaline earth ions [23], undertaken by Jeff Church, and of the redox properties of ceria, including its reoxidation by water and nitric oxide [24], carried out by Celestino Padeste. Studies carried out by Ralf Dümpelmann in Noel Cant's laboratory demonstrated that isocyanic acid, formed by reactions involving H<sub>2</sub>, NO and CO on platinum, was a transient intermediate during the warm-up phase of catalytic converter operation and, through hydrolysis on support oxides, a source of ammonia [25]. A further study for Johnson-Matthey, carried out by Barry Whittington, investigated the relative importance of oxidation, steam reforming and water-gas shift in the operation of motor vehicle catalysts [26]. This was followed by the Ph.D. work of Liyan Ma on the autothermal reforming of light hydrocarbons over two-component oxidation-steam reforming catalysts, either combined or arranged sequentially [27,28].

During this decade David also wrote a review of catalytic combustion with Joo Lee [29], from which evolved studies (undertaken by Vissanu Meeyoo) of the combined adsorption-catalytic oxidation of H<sub>2</sub>S for Johnson-Matthey and the Sydney Water Board [30]. A Ph.D. student (Israha Ul-Haque) investigated the ability of groups IV and V elements to reduce coking of nickel steam reforming catalysts, which led to two US patents that were assigned to Haldor-Topsoe [31,32]. The principles behind the approach were described by David in a plenary lecture given at the First Indo-Pacific Catalysis Conference held in Capetown in 1998 and the resultant short paper has already been cited almost 200 times [33].

David also participated in a diverse range of other projects during this period. They including ones on gas sensors for use in mines, on the disposal of spent refinery catalysts contaminated with heavy metals and on the Arodis process being developed by BHP Petroleum for the conversion of aromatics to cyclohexylbenzene (of potential for use in diesel fuel).

Late in 1999, the light aviation industry in eastern Australia was thrown into turmoil due to the contamination of aviation gasoline by a black substance, which caused the blocking of fuel filters followed by engine shutdown. As a matter of great urgency, the Australian Transport Safety Board asked David to determine the cause. Within a short period he established that the source of the contamination was ethylenediamine, a chemical used as a corrosion inhibitor on the alkylation unit at one refinery. Ethylenediamine was shown to react with brass components in fuel systems to produce the black contaminant [34]. Correction of the problem required cleaning of the entire fuel supply chain, which took months and resulted in the payment of more than \$100,000,000 in compensation to those affected.

### The 21st century

In 2000 David was made a Scientia Professor at UNSW, the highest honour the University awards to working staff members. Later that year he retired from the University, while retaining a laboratory there through the Professorship, to accept a part-time position in the Division of Petroleum at the Commonwealth Scientific Industrial Research Organisation (CSIRO). In 2002 he was encouraged to apply for, and was awarded, a Federation Fellowship, the most prestigious appointment for a scientist in Australia, and the first to be awarded to a person working primarily within CSIRO. This was a full-time position for five years after which he continued as a part-time consultant to CSIRO until his death.

In 2003 David received a Federation Medal from the Commonwealth of Australia and in 2007 a CSIRO Fellowship, the highest award in CSIRO and one of only seven in a community of 6000 professionals. Internationally he was a leading figure in the establishment of the Asia-Pacific Catalysis Society in 2003 and served as the inaugural chairman for the period 2004 to 2006. He received the Award of Excellence at the Eighth Natural Gas Conversion Symposium held in Natal, Brazil, in 2007.

David's primary task after joining CSIRO was to build a group working on the processing of the natural gas available in very large quantity in deep water off the northwest coast of Australia, with production of liquid fuels from other indigenous sources also of interest. The first recruits and their equipment were located at a site in Syndal, a suburb of Melbourne, but were later moved to a nearby site in the suburb of Clayton. This group, now of fourteen professionals under the supervision of Nick Burke, was supplemented from 2006 by a smaller group, now four, located at a special purpose facility in Perth, Western Australia.

The systems investigated have covered a wide spectrum of processes; the partial oxidation of methane, the pyrolysis of methane to acetylene and ethylene, the decomposition of methane to hydrogen with capture of the carbon as a blast furnace feed, the effect of additives on Fischer-Tropsch catalysts, the oligomerization of acetylene, the production of 1,1-dimethoxyethane from acetylene and methanol, production of hydrogen and unsaturated hydrocarbons using redox chemistry and the conversion of eucalyptus oil to liquid products. A number of these projects were undertaken in the laboratory that David retained at UNSW and some fundamental research continues to be carried out there under the supervision of Noel Cant. A number of the studies used proprietary catalysts and/or were carried out in conjunction with industrial partners. As a consequence, the results are yet to be reported in the open literature for intellectual property reasons.

One novel demonstration was that the partial oxidation of methane to synthesis gas could be carried out over a turbine with the blades coated with catalyst, thereby allowing capture of residual energy. The invention was patented [35].

In the first half of 2000 David spent a period of leave at Bogazici University in Istanbul where he co-wrote a review (with Ilsen Onsan) covering the catalytic aspects of the on-board conversion of fuels to hydrogen for use in fuel-cell driven vehicles [36]. This review has already received almost 300 citations and is likely to become his most cited publication within a few years. While working at CSIRO, David found time to supervise the studies of a number of Ph.D. students at UNSW. They included Winnie Kullavanijava and Nick Burke (on combined adsorption/catalytic oxidation), Jason Scott (on surfactants made from ethylene oxide), Praherso (on the oxidation and steam reforming of isooctane), David Chia (the coking of cracking catalysts by squalane), Yun Lei (rhodium-promoted iron oxide for water-gas shift) and Andrew Sim (hydrogen production by the methane-water redox cycle). While at Bogazici University he also advised Ahmet Avci during his Ph.D. work on simulating the use of different fuels for the on-board generation of hydrogen, a cooperation that led to a series of co-authored papers.

In mid-October 2010, David flew with his partner, Gabi, to Hamilton Island off the coast of Queensland for a short stay on the boat of a neighbour. He collapsed and died when leaving the water after snorkeling. It is tragic loss for Gabi.

He will be greatly missed by his many colleagues and friends, in the catalysis community and elsewhere, who have benefited so much from his wisdom and mentoring over more than four decades. His legacy will be long and enduring.

#### Noel W. Cant

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## Curriculum vitae

**Name:** DAVID LAWRENCE TRIMM

**Date of Birth:** 27 April 1937

**Country of Birth:** England

**Nationality:** Australian

### EDUCATION

#### School

Collyers School, Horsham, Sussex, UK  
General Certificate of Education  
Advanced Level: Chemistry, Physics, Maths  
UNIVERSITY

1955–1958

University of Exeter, UK  
Department of Chemistry  
B.Sc. Hons (Class 1)

1958–1961

University of Exeter, UK  
Ph.D. Thesis title: "Free Radical Oxidation of Hydrazoic Acid"

### Post doctoral experience

1961–62

Imperial College, London  
Awarded: BEIT Scientific Research Fellowship in the Department of Chemical Engineering and Chemical Technology  
Research topic: "Free Radical Rearrangements in the Gas Phase"

### APPOINTMENTS

1962–63

University of Chicago, USA  
Department of Chemistry  
Research Associate with Professor J. Halpern

1963–1965

Assistant Lecturer in the Department of Chemical Engineering and Chemical Technology Imperial College UK

1965–1976

Imperial College, UK  
Lecturer in the Department of Chemical Engineering and Chemical Technology

1976–1979

University of Trondheim, Norway  
Professor of Petrochemistry

1978–1979

SINTEF, Research Company of the University of Trondheim  
Research Leader

1979–1985

University of New South Wales, Australia  
Professor and Head of School of Chemical Engineering and Industrial Chemistry (rotating position)

1979–2001

Professor of Chemical Technology, University of New South Wales

1988–1999

Professor and Head of School of Chemical Engineering and Industrial Chemistry (rotating position), University of New South Wales

2001–2004

Appointed Scientia Professor, University of New South Wales.

Only four such professors per year are appointed

2001

Appointed Professor Emeritus, University of New South Wales

2001–2002

Science Leader, Gas Processing CSIRO Division of Petroleum (Part time position)

2008–2008 Federation fellow (full time position)

2007–

CSIRO Fellow

### Honours and Awards

Applied Research Medal, RACI (1988)

Award of Excellence in Chemical Engineering (1997)

Murphy Medal RACI (1997)

Order of Merit of Australia (1998)

Distinguished Fellow, Royal Australian Chemical Institute (Only four have been appointed to date)

Scientia Professor, University of New South Wales (2001 –)

Federation Fellow, (2002 –)

Federation Medal 2003

Award of Excellence at the Natural Gas Conversion Symposium 2007