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Editorial (Special Issue in Memory of the 80th Birthday of Professor Jingfa Deng)

Brief biography of Jingfa Deng

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Jingfa Deng (1933–2001) was a famous physical chemist and chemistry educator who made significant contributions to physical chemistry, heterogeneous catalysis, and surface chemistry. He was a pioneer in fundamental research and industrial applications of electrolytic silver catalysts, introduced vacuum surface chemistry in higher education institutions, and a key figure in the development of amorphous alloy catalysts in China. He embarked on his career at Fudan University in 1959 and worked there until he passed away in 2001. He dedicated himself to teaching and research. As an educator, he gave guidance to many outstanding students. As a researcher, he was renowned for his contributions to the country. One of his many lasting research contributions was propelling China's fundamental research in metal catalysis and novel catalytic materials into the international arena.

1. Arduous student life

Jingfa Deng was born on 4 August, 1933 in Shanghai. His father died in the war when Jingfa Deng was young, and his mother struggled to raise six young children alone. Despite extremely difficult circumstances, his mother still sent Jingfa Deng to the Cunzhi private primary school in September 1940. His mother often used the national crisis and family disaster to teach him to “study conscientiously, and be useful to the nation.” The young Jingfa Deng studied diligently and was academically outstanding. In 1946, he enrolled in the branch of St. Francis Xavier's School in Hongkou District. However, because of the high school fees, he transferred to the Secondary School Affiliated to the Municipal Normal College (renamed the Hongkou Secondary School after liberation) a year later. In 1951, Jingfa Deng was admitted to Faculty of Science at Tongji University, and then transferred to the Department of Chemistry at Fudan University in 1952 after the national college adjustment. After graduation in 1955, he went on to study elec-

trochemistry as a graduate student under the supervision of Professor Haoqing Wu. His difficult childhood, coupled with the values inculcated by his mother, made him extremely tenacious: “My mother, although illiterate, is a lifelong strict teacher for me,” he always said.

2. In his prime

In 1959, shortly after Jingfa Deng began his university career, he married Miss Siwei Zhang, a teacher from the Department of Biology at Fudan University. During this period, Jingfa Deng not only taught chemical thermodynamics to undergraduates but also carried out scientific research on electrochemistry. He directed and completed two projects on “electrolytic production of ammonium persulfate” and “electrolytic production of cuprous oxide”. Both projects led to successful industrial applications, which were cited as successful examples of the industrial application of university research at that time. He also published more than ten papers and was promoted to lecturer in 1963.

Jingfa Deng in his prime.

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3. Persistence in special times

Just when Jingfa Deng was gaining recognition for his academic contributions, the Cultural Revolution broke out and disrupted his teaching and research activities. In the subsequent long tumultuous years, Jingfa Deng continued to seek opportunities to use his talents. In 1972, he was appointed lecturer for the fundamental course in physical chemistry, which he continued to teach until 1997. His lectures were not only well organized, but also easy to understand. He focused on integrating theory with practice, making his classes vivid, lively, and popular among students. The abstract concepts and abstruse theories of physical chemistry became compelling, clear, and easy to understand when illustrated with examples from his research and industrial experiences. His first textbook, *Physical Chemistry*, was published in 1977 by the People's Education Press.

4. His silver adventure

In 1972, when Jingfa Deng was working in the Shanghai Solvent Factory, he found that pumice silver catalyst was still used to produce formaldehyde in this factory. Some workers were burned by concentrated nitric acid during treatment of the catalyst. The formaldehyde industry started in the 1950s in this factory, and used the Soviet Union's gas-solid multiphase oxidative dehydrogenation technology, which involved a complex synthetic procedure and was very labor-intensive. Large amounts of harmful nitrogen oxides were produced when treating the catalyst precursor, resulting in serious pollution. Moreover, the low catalytic activity required high methanol

Family photograph taken in 1970 at the fourth dormitory of Fudan University.

In his office in the 1970s.

In the laboratory in the 1970s.

consumption. On returning to the laboratory, he and his colleagues conducted a study of electrolytic silver catalysts. The strong sense of responsibility felt by these vigorous young men drove them to work tirelessly. After numerous trials, an electrolytic silver catalyst was successfully developed. This catalyst had high catalytic activity and selectivity. It was also easy to prepare, non-polluting, and recyclable. If used as a substitute for pumice silver, it could reduce the unit consumption of methanol. The catalyst was immediately adopted by tens of factories nationwide. The main technical parameters were deemed to have reached international standards. Catalysts in this class are still used in most formaldehyde production factories today. This project won the second-class prize for major scientific and technological achievements in Shanghai, as well as the Ministry of Chemical Industry and Technology Achievement Award in 1980. It also won the fourth-class prize in the National Invention Awards the following year.

5. Probing surfaces

The year of 1978 was a second spring for China's education and scientific communities. Jingfa Deng was encouraged and in high spirits. As a result of his outstanding achievements in teaching and scientific research, he was promoted to associate professor of chemistry. The success of his electrolytic silver catalyst turned his research interests from electrochemistry to catalysis. In the early 1980s, he realized that it was possible to perform in-depth studies of catalysis on solid surfaces at a molecular level as a result of developments in surface chemistry. However, the study of surface chemistry required sophisticated and expensive tools and instruments, and research funds were limited. He made use of the available resources and managed to design and assemble various spectrometers with the help of his graduate students. A surface chemistry laboratory was subsequently established in the Department of Chemistry, Fudan University. It was one of the first laboratories in China to study surface adsorption and catalytic mechanisms on solid catalysts at the molecular level. It was in this laboratory that Jingfa Deng guided students to conduct a comprehensive and systematic study of the role of electrolytic silver. He proposed and experimentally confirmed the back-donating bonding model of ad-

sorbed oxygen on Group IB metals and the existence of induced acidity, thereby pointing out the importance of s-electrons in the synthesis of formaldehyde from methanol. Based on this finding, a new generation of modified electrolytic silver catalysts with improved productivities was developed. Using his knowledge of the oxidation mechanism of methanol, he extended the use of electrolytic silver catalysts to the catalytic oxidation of glycol to glyoxal. This was the first time that this technology had been used in industrial production anywhere in the world, and it increased glyoxal production by 20%. For these achievements, Jingfa Deng won the second-class and third-class prizes in the Science and Technology Progress Awards of the State Education Commission in 1986 and 1990, respectively.

A supported silver catalyst ($\text{Ag}/\text{Al}_2\text{O}_3$) was used in the industrial epoxidation of ethylene to ethylene oxide. For a long time, researchers generally agreed that adsorbed molecular oxygen was the active oxygen species for epoxidation. According to the reaction mechanism based on molecular oxygen, the maximum selectivity for ethylene oxide could not exceed 85.7%. Through surface chemistry research, Jingfa Deng and his team discovered that molecular oxygen adsorbed on the electrolytic silver catalyst did not lead directly to the epoxidation and deep oxidation of ethylene, and that atomic oxygen on the surface was the active species. They also found that additives could improve the selectivity for ethylene oxide through electronic effects. The addition of trace amounts of Pd and Re to the electrolytic silver catalyst increased the selectivity for ethylene epoxidation to 94%, exceeding the originally proposed

limit of 85.7%. This result also indirectly proved that atomic oxygen is the active species. This achievement secured the second-class prize in the Science and Technology Progress Awards, Ministry of Education, in 1998.

6. Amorphous alloy catalysts

In 1984, the State Education Commission promoted Jingfa Deng to full professor and PhD supervisor of physical chemistry majors. In the same year, he pioneered research in China into the preparation of amorphous alloy catalysts by chemical reduction. The surface areas of amorphous alloys prepared using the traditional quenching method were low, normally at the level of 0.1–1.0 m^2/g , and their activities were deemed to be too low for industrial applications. Jingfa Deng deposited the amorphous alloy on a support with a large surface area, thus obtaining a highly dispersed amorphous alloy. This new method was highly regarded both internationally and nationally as a promising solution. The loading could significantly increase the surface area of the amorphous alloy and the number of active sites, thereby improving the catalytic activity and reducing the amount of active metal used and the catalyst cost. Because of the highly dispersed nature of the amorphous alloy and interactions with the support, the stability of the amorphous alloy was substantially enhanced at elevated temperatures for longer reaction periods. In addition, supports with specific pore structures and acidities could be selected to meet the requirements of different reactions, greatly broadening the applications of amorphous alloy catalysts. Supported amorphous alloy catalysts can be used with gas-solid systems and are also applicable to liquid-solid reactions, with the advantage of easy recovery. By adding rare-earth elements to amorphous alloys, Jingfa Deng raised the crystallization temperature by 100–150 $^\circ\text{C}$, which further extended the usefulness of amorphous catalysts. These works laid a solid foundation for the practical applications of amorphous alloys as catalyst materials. He subsequently developed various new amorphous catalysts for hydrogenation reactions, and filed for patents in the United States, Japan, France, and Italy; the catalysts included a Ni-Co-B catalyst with a catalytic activity for benzene hydrogenation eight times that of Raney nickel. Research into supported amorphous alloy catalysts was featured in *Catalysis Today* and *Current Topics in Catalysis* in 1998.

7. Born to teach

Jingfa Deng taught at Fudan University for over 40 years. As well as conducting lectures in physical chemistry, from 1984 he developed several graduate course modules, including *Molecular Catalysis* and *Surface Chemistry*, and continued lecturing up to his last day. His remarkably effective teaching resulted from his ability to incorporate the latest international research achievements and his own research knowledge and experience. He was quoted as saying “At university, faculty members must produce high-quality research work before they can teach high-quality courses and produce high-quality students.” The grades of his physical chemistry students were notably

Guiding Dr. Xinhe Bao to do research work in the 1980s.

Conducting research using a custom-built instrument in the 1980s.

amongst the best, year after year, during the five terms of the Chemistry Graduate Program supported by China and the United States. His achievement in “Content Reform and Practice of Physical Chemistry” won the grand prizes for College and University Teaching Achievement for individuals in his local city and nationally. At Fudan University, he was repeatedly cited as a “Prominent Faculty Member” and “Best Teacher”. In 1986, he was named “State Class Prominent Young and Middle-Aged Scientist”. In the same year, his book *Introduction to the Principles of Catalysis* won the second prize in Best Scientific Book of North China. He also won national medals for Model Worker and Best Teacher in 1989, and the “Golden Horse” medal awarded by the State Education Commission and State Scientific and Technological Commission in 1990. In recognition of his outstanding achievements in both research and education, he was invited to the meeting held by the Propaganda Department of the Communist Party of China, and State Education Commission in 1991. In addition, he won several other local and national awards and accolades. In 1995, he and Kangnian Fan edited a textbook, *Physical Chemistry*, which coupled the macro and micro levels, integrating and introducing important concepts into this new version of “Physical Chemistry”. This textbook won the top prize in the Excellent Textbook Award of Colleges and Universities of Shanghai, and of the State Education Commission. In 1997, this textbook won the second prize in the Shanghai Science and Technological Progress Awards.

Lecturing undergraduates.

Discussions with graduate students in the early 1980s.

8. Mentor and friend

In the eyes of Jingfa Deng, although a faculty member has to juggle many duties such as lecturing and conducting research, the single most important role for any faculty member is to cultivate students, and that should remain the priority. Year after year, his advice to new graduate students would be to remain honest, humble, and hardworking. At their graduation, he would tell them earnestly that “Young generations are the future of the country, and should shoulder the important task of strengthening and revitalizing China, regardless of where they are. One must put the interests of the motherland first, be patriotic, dignified, and morally upright. The Chinese will be well regarded internationally if China remains strong and powerful.”

Jingfa Deng served as an exemplary role model to his students. He often said: “One must be serious when teaching students and be genuine when displaying affection towards them.” He was known to be a strict teacher and always advised his new graduate students to be mentally prepared for hardships in scientific research. He would check the laboratories every day to review students’ research progress. At the group meetings held every Saturday, he would encourage students to engage in lively discussions of academic issues, to be bold and innovative, and to be prepared to expound their findings collectively. He saw the importance of fostering independence in graduate students. He gave students advice and assistance at critical times, but he required students to work independently in virtually every aspect of their academic pursuits from searching for references, writing proposals, and designing experiments to writing papers and theses.

Inviting his student, Jun Yang, to enjoy the Chinese New Year in 1996.

Teaching graduate students and young teachers in August 2000, organized by the Ministry of Education.

9. Notable fruits

Jingfa Deng worked tirelessly in teaching and research and made great achievements. He trained a large number of students for the country, including about 30 PhD and 23 Master's degree holders, not to mention thousands of undergraduates. Some of these have become academicians of the Chinese Academy of Sciences (CAS) and/or world-renowned specialists and scholars. He published four books and 249 papers and was invited by Princeton University, Waseda University, Tokyo University, and the National University of Singapore to give lectures and engage in academic exchanges. In 1995, he was elected an academician of the CAS for his outstanding contributions in the areas of catalysis and surface chemistry.

10. Unfaltering aspirations

Many years of conducting fundamental research and of

At the University of Tokyo, Japan, in 1994 with Professor Iwasawa Yasuhiro.

At National University of Singapore in 1995.

At City University of Hong Kong in 1997 with Professor Kangnian Fan.

practical industrial experience set Jingfa Deng thinking about integrating scientific research more closely with national economic development. In 2000, a large state-owned coal chemical company in Shanghai was adversely affected by changes in national energy policies and was urgently in need of developing new chemical products and its ability to conduct independent R&D. After Jingfa Deng contacted the company and investigated the situation, the Shanghai Coking-Fudan Catalysis Investigation Center was eventually established. When it was established, he made it clear that the purpose of setting up the joint laboratory was not merely to receive funds for scientific research, but to add value to the company. It was therefore envisaged that the Center would become a scientific research base that truly contributed to national economic development. Following his initiative, the joint laboratory not only established a set of working procedures that was well suited to collaboration between universities and industry, but also ensured a synchronous and mutually beneficial relationship in the long run. Despite the unfortunate passing of Jingfa Deng, the joint laboratory continues to play a pivotal role in collaborative efforts in education, research, and industry. In recent years, this joint laboratory has made significant achievements in scientific research and has been granted more than ten technology patents. It helped to develop a series of catalytic systems for the production of glycols and successfully provided technical support for company transformation, fulfilling Jingfa Deng's wishes.

11. Encapsulating his life in words

On New Year's Day in 2001, Jingfa Deng had a discussion

Organizing the Second Cross-Strait Catalytic Conference in 2001.

Attending CAS general assembly with his mentor, Haoqing Wu.

with some young students on “how to do scientific research”. At the end of the discussion, he expressed his thoughts in these words: “There are tens of thousands of answers to this question. But to me, the one and only answer is ‘Conducting research with one’s own life.’” These words encapsulated the lifelong journey he embarked on. His decades-long journey halted abruptly in the early morning of 12 May 2001 with a fatal heart attack.

His nature was to seek the truth, to be pragmatic, and to be true to himself, to others, and to things.

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邓景发先生传略

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邓景发先生(1933~2001), 物理化学家, 化学教育家, 在物理化学及多相催化、真空表面化学教学、科研领域做出了重要的贡献。他是我国电解银催化剂基础研究和应用的开拓者, 高校真空表面化学研究的先行者, 非晶态合金催化剂研究的重要奠基人。自1959年于复旦大学留校工作至2001年去世, 他始终勉力耕耘在教学和科研的第一线, 为我国培养了一批活跃在教学和科研领域的优秀人才, 对推动我国金属催化和新催化材料的基础研究步入世界先进行列, 做出了卓越贡献。

1. 艰辛求学

1933年8月4日邓景发出生于上海。幼年时父亲即在战乱中去世, 母亲独自抚养6个未成年子女。1940年9月母亲在极度困难的情况下依然送7岁的邓景发到私立存智学校上学。母亲常以国难、家难的事例教育他“勤奋读书, 做一个对国家有用的人”。幼年的邓景发学习勤奋刻苦, 成绩名列前茅。1946年, 小学毕业的邓景发到私立圣芳济中学虹口分部读书。一年后, 由于交不起昂贵的学费转入市立师范附中(解放后更名为虹口中学)学习, 在那里完成了中学的学业。1951年, 邓景发考入同济大学理学院, 1952年全国高等学校院系调整后转入复旦大学化学系学习。1955年大学毕业后师从吴浩青教授攻读电化学专业研究生, 1959年研究生毕业后留校工作。少年时期艰难的境遇和母亲的谆谆教诲对邓景发后来始终不渝地顽强拼搏的精神产生了巨大的影响。他常对人说: “母亲虽然一字不识, 却是我的严师, 一位终身的严师。”

2. 风华正茂

留校工作后不久, 风华正茂的邓景发与同校生物系

教师张四维建立了的美满的家庭, 同时开始了他教学和科研并重的人生道路。在此期间, 邓景发不仅为本科生讲授“化学热力学”课程, 并开展电化学科学研究。他主持完成了“电解法生产过硫酸铵”和“电解法生产氧化亚铜”两个项目, 并且都应用到工厂的生产中, 成为当时高校科研成果产业化的一面旗帜, 同时发表了十余篇论文, 1963年晋升为讲师。

3. 发奋不辍

正当他崭露头角时, 爆发了“文化大革命”, 教学和科研工作被迫中断。在漫长的动荡岁月中, 邓景发仍在寻求发挥作用和施展才华的机会。1972年, 邓景发被任命为化学系基础课“物理化学”的主讲教师, 从此之后他坚持讲授该课程直至1997年。他讲课不仅条理清楚, 深入浅出, 注重理论联系实际, 而且生动活泼, 深受学生欢迎。物理化学的抽象概念和深奥理论, 经他联系科研实际和工厂生产实例讲解后变得有物有例, 引人入胜, 清晰易懂。1977年人民教育出版社出版了他编写的第一本教材著作《物理化学》。

4. 银色起程

1972年, 在一次下厂劳动中, 邓景发发现上海溶剂厂的甲醛生产仍用浮石银作催化剂, 有工人在用硝酸处理催化剂时还被浓酸烧伤。同时了解到我国甲醛工业始于上世纪50年代的上海溶剂厂, 当时采用苏联的气—固多相氧化脱氢工艺技术, 在低于常压的条件下, 经水稀释的甲醇蒸发后与浮石银催化剂在高温下反应。浮石银催化剂的制备工艺繁杂, 劳动强度大; 催化剂前体热处理中产生大量的氮氧化物有害气体, 环境污染严重; 催化剂活性低, 原料甲醇的单耗较高。返回学校后, 他与同

事一起开展了电解银催化剂的研究,强烈的责任感和年轻人旺盛的精力使他们不知疲倦地工作着,经过夜以继日的反复试验,电解银催化剂研制成功.该催化剂具有催化活性高、选择性好、制备简便、高温处理时无污染、再生容易、银回收率高等优点.用它代替浮石银可以降低原料甲醇的单耗,所以很快在全国几十家工厂推广应用,主要技术指标达到国际先进水平,该系列催化剂一直为国内大多数甲醛生产厂沿用至今.该科研成果于1980年获上海市重大科技成果二等奖、化学工业部科技成果奖,1981年获国家发明四等奖.

5. 表面探微

1978年,我国教育界和科学界迎来了第二个春天.邓景发更是精神振奋,意气风发.由于他在教学和科学研究上取得的突出成绩,这一年他晋升为化学系副教授.电解银催化剂成功的工业化应用使邓景发的科研兴趣由电化学转向催化,但是深入的催化研究面临着许多难题和挑战.上世纪80年代初,邓景发注意到表面化学的发展,使人们从分子水平上研究固体表面上的吸附和催化过程成为可能.但是研究表面化学需要特殊的手段和仪器,在当时的条件下没有足够的经费去购置昂贵的能谱仪.为了能尽快更深入地研究催化剂表面的有关问题,他利用国内既有条件,与研究生们自行设计组装了多种研究固体表面的能谱仪,在复旦大学化学系建立了表面化学实验室.这是国内较早建成的一个从分子水平上研究表面吸附和催化反应机理的实验室.

基于这个实验室,邓景发指导学生对甲醇制甲醛反应中电解银的催化作用作了全面系统的研究,提出并实验证实了IB族金属吸附氧的反馈键模型和催化剂表面存在的诱导酸性,指明了s电子在催化过程中的重要作用.在这种电子效应理论的指导下,找到了良好的助催化剂,研制成新一代的修饰电解银催化剂,提高了甲醛的产率.根据甲醇氧化为甲醛的反应机理,他将电解银催化剂推广到乙二醇催化氧化制乙二醛,研制的工艺应用于工业生产,使乙二醛的产率提高20%,属国际首创.上述研究成果分别于1986年和1990年获国家教委科技进步二等奖和三等奖.

乙烯氧化为环氧乙烷工业上使用负载银($\text{Ag}/\alpha\text{-Al}_2\text{O}_3$)催化剂,但对反应机理和助催化剂的作用一直存在较多争议.长期以来,学者普遍认为吸附的分子态氧是环氧化的活性氧物种.根据该分子氧反应机理,环氧乙烷的最高选择性不超过85.7%.邓景发等通过表面化学研究发现,电解银催化剂上吸附态的分子氧

对乙烯的环氧化和深度氧化不起直接作用,而吸附态的原子氧则是反应的活性物种.通过研究银与吸附氧的相互作用,发现添加剂通过电子效应提高了环氧乙烷的选择性.在电解银催化剂中加入微量的铈和铈后,乙烯环氧化的选择性达到94%,突破了85.7%这一极限,这也从另一个侧面证明了原子氧是活性氧物种.该研究成果于1998年获教育部科技进步二等奖.

6. 非晶锕英

1984年,邓景发经国家教委特批晋升为教授和物理化学专业博士生导师.也是从这一年开始,邓景发在国内率先开展了化学还原制备非晶态合金催化材料的研究.用传统的骤冷法制得的非晶态合金比表面积小,一般为 $0.1\sim 1.0\text{ m}^2/\text{g}$,用于工业生产活性低.邓景发在国际上首次用化学沉积法将非晶态合金负载在大比表面积的载体上,得到了大比表面积的非晶态合金.这种把非晶态合金以高分散形式负载在载体上的方法,受到国内外同行的高度重视,认为是一种很有希望的方法.一方面,负载化可增加非晶态合金催化剂的比表面积和活性中心的数目,提高催化活性,从而降低活性金属组分的用量和催化剂的制备成本;另一方面,由于非晶态合金高度分散在载体上及其与载体之间的相互作用,可提高非晶态合金的热稳定性,使其在较高温度和较长时间的反应过程中能保持非晶态结构;此外,可选择特定孔结构和酸碱性的载体来满足不同反应的需要,从而拓宽了非晶态合金催化剂的应用领域.负载型非晶态合金催化剂可用于气固相反应,在液相反应中更便于回收.为了进一步提高非晶态合金催化剂的稳定性,邓景发通过在非晶态合金中添加稀土元素,将晶化温度提高了 $100\sim 150\text{ }^\circ\text{C}$,从而拓宽了非晶态催化剂的使用温度,为非晶态合金作为催化剂材料的应用奠定了坚实的基础.他研制成多种用于加氢反应的新型非晶态合金催化剂,在美国、日本、法国和意大利四国申请了专利,其中Ni-Co-B催化剂对苯加氢的活性比工业上广泛使用的瑞尼镍高8倍.负载型非晶态合金催化剂的研究成果1998年分别被邀在《Catalysis Today》和《Current Topics in Catalysis》上撰写专文加以介绍.

7. 教师天职

邓景发先生在复旦大学从事教学工作40余载,除了长期担任“物理化学”课程的教学以外,从1984年开始,他为研究生开设了“分子催化”、“表面化学”等课程,一直讲授到他去世前.他对教学内容和教学方法进行改革,

把国际最新科研成果和自己的科研心得融入到教学中去,教学效果非常突出.他认为,“在大学,教师要有高水平的科研工作,才能有高质量的课,才能培养出高水平的人才”.他所教学生在全国共举行的五届中美联合出国研究生(CGP)考试中,有三届学生获总分第一名和个人第一名,两届获总分第二名和个人第二、第三名,物理化学成绩届届名列前茅.他的教学成果“物理化学课程改革及实践”,获上海市普通高校优秀教学成果特等奖(个人)全国普通高校优秀教学成果优秀奖(个人).他多次被学校和学生评为“先进教育工作者”,“我们心中的好老师”;1986年被授予“国家有突出贡献的中青年专家”称号,同年他的著作《催化作用原理导论》获北方十省市优秀科技图书二等奖;1989年他还被评为全国教育系统劳动模范,被授予“人民教师”奖章;1990年他被国家教委和国家科委授予先进科技工作者和“金马”奖章;1991年出席中共中央宣传部、国家教委组办的“教书育人成绩突出,全国高等学校教书育人座谈会”,在会上作了发言介绍.他获得了全国和上海市普通高校优秀教学成果奖和特等奖、宝钢教育奖特等奖.1995年他与范康年编著的宏观与微观内容相互联系、相互渗透的新版《物理化学》获上海市普通高校优秀教材一等奖和国家教委普通高校优秀教材一等奖,1997年获上海科技进步二等奖(著作类).

8. 严师益友

邓景发认为:“上课也好,搞科研也好,育人是教师的天职,是第一位的.”每年研究生入学时,他总要找学生谈话,教导他们“为人要真,待人要诚,做事要勤”.当学生毕业时,他也语重心长地对他们说:“青年是国家的未来,应肩负起振兴中华的重任,无论是在国内还是在海外,都要把祖国的利益放在首位,要有爱国心,要有民族的尊严和高尚的道德情操.只有祖国的富强,我们在国际上才有真正的地位.”他很注重教师率先垂范的作用,凡是要求学生做到的自己先做到,凡是要求学生不做的自己坚决不做.他常说:“教学生要严,爱学生要真.”他是出名的严师.他对报考他的研究生见面第一句话总是:“做学问是一件十分艰苦的事,不能吃大苦者不入此门.”他每天都要到实验室检查,指导学生的学习和科研.在每周六举行一次的全组研讨会上,他鼓励学生对有关学术问题进行争论,大胆创新,进行集体论证.他非常重视研究生独立工作能力的培养,他除在关键之处予以指导和把关外,从查阅文献,下基层或工厂实地调查,到制定研究方案,设计仪器设备和研究方案的实

施,最后书写成论文,都要求学生独立完成.

9. 成果累累

邓景发几十年如一日,在教学和科研岗位上辛勤工作,取得了卓越的成就,为国家培养了大批优秀人才,其中博士近30名,硕士23名,有的已成为中科院院士或国内外著名的专家学者.邓景发出版专著4部,发表论文249篇;他先后应邀赴美国普林斯顿大学、日本早稻田大学、东京大学、国立新加坡大学讲学和学术交流.1995年,他因在催化和表面化学领域的突出贡献而当选为中国科学院院士.

10. 壮心不已

多年的基础科学研究以及在工业生产第一线的实践经验,促使邓景发一直在思考如何把科研与国民经济建设更加紧密地结合起来.2000年,上海一家大型煤化工国有企业因国家能源政策的变化,急需开拓新的化工产品,提高自主研发水平.他听闻此事,主动与企业联系,并到该公司实地考察生产技术、设备及其相关产品的产能等状况,最终组建了上海焦化-复旦催化研究中心.联合实验室创建之初,他就明确,“办联合实验室不能只想着从企业获得科研经费,更要想着如何为企业服务,我们的联合实验室就是要办成真正为我国经济发展效力的科研基地”.在他的倡导下,联合实验室建立了一套适应校企挂钩、相互促进、同步开发的研究工作体系和工作制度,保障了该实验室长期持久地发挥作用.虽然邓景发翌年就不幸离开了人世,但是他倡导并建立的联合实验室至今仍然在“产学研”的道路上继续发挥着重要作用.近年来,该联合实验室已经完成了一批科研成果,取得技术专利十多项,基本形成了二元醇生产的系列催化剂体系,成功地为企业转型提供了技术支撑,实现了他的愿望.

11. 一语人生

2001年元旦邓景发和几位青年学生交谈“怎样做科学研究”,结束时他写了以下几句话:“怎样做科学研究,答案有千万个.对我来讲,答案只有一个,那就是用生命去做研究”.邓景发“用生命去做研究”,几十年如一日,直到2001年5月12日凌晨因心脏病发作离开人世.

他一生求真务实,对己、对人、对事都是如此.

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