

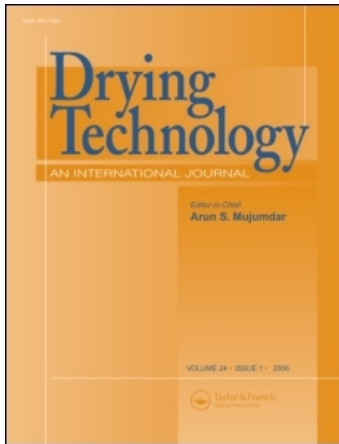
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## Report on Honorary Doctorate for Editor-in-Chief Professor Arun S. Mujumdar Receives Doctor Honoris Causa Award from Lodz Technical University, Poland on June 11, 2008

Professor Arun S. Mujumdar was awarded the prestigious Doctor Honoris Causa degree by Lodz Technical University, Lodz, in Poland for his distinguished accomplishments in the world's chemical and process engineering, especially for the contributions to the promotion and development of drying technology. Professor Arun S. Mujumdar received this honorary doctorate on June 11, 2008, in Poland.

As the “Drying Guru,” Professor Mujumdar's achievements are impressive and include numerous contributions in the area of research, cooperation with industry, international relations, education, editor, etc.; as Professor Jamal Yagoobi of the Illinois Institute of Technology in Chicago said, “Honestly, I cannot think of any other individual whose contribution to the field of drying could come close to Professor Mujumdar's.” Professor Mujumdar is not only a man of high scientific authority and world renown, but he is one with personality of great culture and moral values. It can be said that the award follows naturally real distinction.

The candidature of the honorary doctor degree was reviewed and approved by three universities in Poland, which is a very special procedure that Polish universities follow. A special grand convocation ceremony was held to award two such honorary doctor degrees (another one awarded to Professor Eric Vandamme from Ghent, Belgium). The platform party included the rector, the chancellor, all four vice rectors, and deans of various faculties of Lodz Technical University in their official robes. Although this was held right in the examination period, a large number of staff members, graduate students, and faculty members attended the ceremony held in a large auditorium used for convocation. Professor Mujumdar was conferred the Doctor Honoris Causa diploma in the form of a scroll in Latin and in Polish by the Dean of the Faculty of Process and Environmental Engineering, Professor J. Krysinski; this event was also covered in the local press. The mayor of Lodz as well as a number of press people attended the event. Professor Mujumdar was named a citizen of the city of Lodz and a member of the faculty of Lodz Technical University as well. Several congratulatory letters were sent by Łódzki Kurator Oświaty, Wojewoda Łódzki and the rectors of many Polish universities, including Uniwersytet Technologiczno-Przyrodniczy, Politechnika Śląska, Uniwersytet Zielonogórski, Politechniki Rzeszowskiej, Uniwersytet Warmińsko-Mazurski, Politechniki Szczecińskiej,

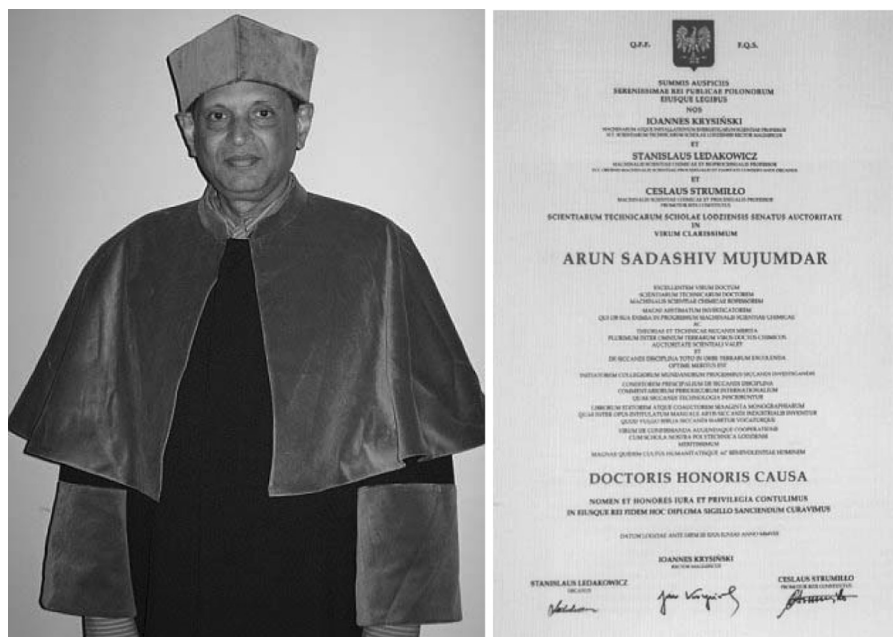
Poznan University of Technology, Wrocław University of Technology, Military University of Technology. During his brief visit to Poland, Professor Mujumdar also gave research seminars at Warsaw Technical University and Lodz Technical University.

In the ceremony, Professor Strumillo first presented a detailed citation for the Doctor Honoris Causa Award, which indicated the primary reasons for conferring this award on Professor Mujumdar. In his citation address, Professor Strumillo gave a high evaluation of Professor Mujumdar's scientific accomplishments and personality and pointed out Professor Mujumdar's main contributions to many areas, especially to drying technology. He also illustrated the nice and productive relationship between Professor Mujumdar and Polish chemical engineering. The full text of his address is as follows:

Professor Mujumdar is a distinguished scientist in the world's chemical and process engineering field, especially in the theory and practice of drying processes. He was born in India in 1945. He graduated with distinction from the University of Mumbai with a degree of bachelor of chemical engineering and continued his education at McGill University in Montreal. After he received the degree of master of engineering he spent 2 years as a research engineer in industry (Carrier Corp., Syracuse, NY), where he continued to complete his Ph.D. thesis, which he defended in 1971. As an academic faculty member he was promoted consecutively to the following positions in McGill's Chemical Engineering Department: research associate (1971–1975), assistant professor (1975–1978), associate professor (1978–1986) and professor (1986–2000). In 2000 he became professor of mechanical engineering at the National University of Singapore (NUS).

Prof. A.S. Mujumdar is a leading personality in the world's drying technology. He is often referred to as the “Drying Guru.” His achievements are impressive and include numerous contributions in the area of research, cooperation with industry, international relations, positions held in both universities, organization of international conferences, promotion of young researchers, and many others. His editorial achievements are especially worth noting.

He is author or coauthor of over 400 publications in scientific journals, over 100 chapters in books, and over 300 conference publications. He has also delivered over 60 plenary or keynote lectures at international conferences in four continents. Professor Mujumdar has acted as



Prof. Arun S. Mujumdar in the convection gown and Doctoris Honoris Causa Award from Lodz Technical University.

consultant to some 70 companies in the USA, Japan, Germany, Australia, China, and other countries. He is an editor and coeditor of 60 books on drying and transport processes. He has supervised over 40 doctoral theses and has been a mentor of young interns from many countries. His great contribution was to familiarize English-speaking scientists involved in drying technology with research results obtained in Russia, Germany, Japan, and other countries.

The monographs and the journal *Drying Technology* edited by Professor Mujumdar since 1988 are well known in Poland, especially at the Technical University of Łódź, where members of staff and students use them as a valuable source of information containing knowledge on boundary layer theory, transport thermodynamics, and physics of disperse materials. His extensive editorial activity contributes to the synthesis of current global knowledge on drying technology, providing a consistent image which reflects the role of mass transfer in capillary-porous systems and dynamics of nonequilibrium evaporation processes in dried bodies.

His research, experimental, and modeling works cover almost all physical forms of wet materials dried in at least 20 different systems. Many of these works are innovative in nature, which were later studied and developed by other researchers.

Professor Mujumdar has received many international awards and honors for his outstanding achievements and contributions to chemical engineering, especially drying technology and heat and mass transfer.

However, Professor Mujumdar's key achievement is his contribution to the promotion and development of drying technology as a multi- and interdisciplinary field of study on a global scale. He initiated the biennial International Drying Symposium (IDS) series, which has been the main forum for the exchange of ideas, experience, and innovations in drying technology continuously since 1978. As the permanent chairman of scientific committees of the IDS Symposia, Professor Mujumdar contributed to the continually increasing importance of these meetings. An equally important achievement was the launching of *Drying Technology—An International Journal* in 1982. Professor Mujumdar, as Editor-in-Chief of this journal since 1988, has contributed to its world recognition and renowned position on the Philadelphia list. His activity enabled consolidation of the specialists in drying technology from over 50 countries. Numerous regional conferences on drying were held in various parts of the world. Professor Mujumdar is usually a co-organizer and promoter of such meetings, ensuring their continuity and proper level. His editorial work on the *Handbook of Industrial Drying* is also worth mentioning. The third edition of this book, often referred to as "The Bible of Drying," was published in 2007 (1300 pages, 53 chapters, 69 authors from 22 countries including 6 chapters written by Polish authors).

Specific research areas cover paper drying, water steam drying, electroosmotic dewatering, computational fluid dynamics, unsteady melting and freezing phenomena, drying in fluidized, vibro-fluidized, and spouted beds, transport processes in turbulent jet flows, heat pumps,

drying of thermo-labile materials, and industrial applications of the drying process. Owing to Professor Mujumdar's research, many aspects of the drying process could be explained and innovative design solutions and special techniques were introduced.

Professor Mujumdar's rich scientific output, both in terms of source literature and monographs, made it possible to include the drying process into other theoretical unit operations, arrange and extend the data which refer to the classification, selection, and design of drying equipment. It also helped in recognizing many key issues neglected so far and elevating them to the level of more advanced unit operations in chemical and process engineering.

Professor Mujumdar spent many months as a visiting professor in the leading scientific centers in USA, Japan, India, Brazil, China, Argentina and Malaysia and he conducted seminars in numerous universities in Europe, Asia, North and South Americas, and the Pacific Rim. Due to the unique role of Professor A.S. Mujumdar and his contributions, drying technology gained an important position, which differed significantly from the one it had over 30 years ago.

In general, Professor A.S. Mujumdar's activities in respect of his editorial work, mentoring of young staff, research and innovative contributions, his extensive consultations with industry, plenary lectures, scientific relations with major drying research centers in the world, and many other pioneer actions promoting the drying process have put him in the drying community as a leader and visionary incessantly for almost three decades. His involvement and talent resulted in the development of a drying unit operation as a modern interdisciplinary discipline having its own R&D prospects. The drying technology, which exists for many years, never before has been of such importance and significance in the concordant assessment of academia and industry people as well as sponsors of research projects. We owe this to Professor Mujumdar.

I believe that my opinion on the role Professor Mujumdar played in the development of drying will be best supported by a quotation from the address by Professor Jamal Yagoobi of Illinois Institute of Technology in Chicago, on the occasion of the 60th anniversary of Professor Mujumdar: "Honestly, I cannot think of any other individual whose contribution to the field of drying could come close to Professor Mujumdar's".

All the achievements of Professor Mujumdar have been hard-fought and resulted from his commitment. I trust that one more person is worth mentioning here, which is in the shadow of his activity: Mrs. Purnima Mujumdar, who has been of great assistance in his life and work. It is our pleasure to welcome you, Purnima—we are happy having you with us today. We know and appreciate your hard work in the name of disseminating knowledge.

The relationships of Professor Mujumdar and Polish chemical engineering have been multilateral and intense. The beginning of these relations dates back to the seventies of the 20th century. Professor Mujumdar visited Poland many times. He participated in the IDS in Krakow organized by the Lodz Drying Group, where he was awarded the prestigious Copernicus Medal of the Polish Academy of Sciences for Contributions to Chemical Engineering. In 2005 he took part in the 9th Polish Drying Symposium in Poznan, where he delivered a plenary lecture. Three young members of staff from Lodz were on long-term scientific internships at McGill University in Montreal under the supervision of Professor Mujumdar. Our cooperation has resulted in many joint publications.

Owing to the modern means of communication we are in continuous link with Professor Mujumdar and are kept informed about the latest scientific and industrial achievements.

Ladies and gentlemen, this is how I would like to introduce to you the candidate for the title of Honorary Doctor of the Technical University of Łódź: Professor Arun Sadashiv Mujumdar:

- a man of high scientific authority and world renown; the author of numerous publications, chapters in books, monographs, conference presentations, and lectures;
- the editor and coauthor of numerous monographs which are the source of modern knowledge on drying and related fields;
- the initiator of the World Drying Symposia and the flagship journal on drying;
- the distinguished promoter of drying on a global scale;
- the professor who has contributed to the fruitful cooperation of the Faculty of Process and Environmental Engineering of the Technical University of Łódź with McGill University in Montreal and National University of Singapore;
- the personality of great culture and moral values;
- a friend of our Technical University and Poland.

Professor Mujumdar gave an acceptance speech upon receiving the Doctor Honoris Causa scroll in the ceremony. We believe our readers can benefit from reading it. It is therefore reproduced here.

Honorable Rector, Technical University of Lodz, Members of the Senate, Distinguished Guests, Ladies and Gentlemen:

It is with great humility and gratitude that I accept this honor you have kindly bestowed upon me today. It is by far the most significant honor I have been conferred upon and I shall forever treasure it. I want to express my sincere appreciation to everyone and all the academic bodies as well as institutions involved in the process of conferring

this highly prestigious award of Doctor Honoris Causa upon me at this memorable ceremony.

I take this as recognition of the collective efforts of my numerous mentors at the University of Mumbai, India, and at McGill University, Canada, as well as the hard work put in by my research students, associates, and collaborators at the National University of Singapore as well as many around the world. I have learnt much from both my senior mentors and my junior students and associates. It has indeed been an absolutely delightful journey of well over three decades of teaching, advising as well as learning from and working with many of my bright, enthusiastic, diligent, and conscientious research students and associates.

Also, I wish to record the support and encouragement I received from my family members, in particular from my wife Purnima. Likewise, my postgraduate students, research associates, and research collaborators have generously provided assistance whenever it was needed. I wish to say a big “Thank You” to them all and accept this honor on their collective behalf.

May I take this opportunity to say few words about a few general topics of my interest as well as my research and professional activities over the years. Briefly, I would like to point out unanticipated implications of some buzzwords we hear all the time, namely, globalization, R&D, and innovation. They all have major impact on today’s academia. Of course, this is a topic worthy of a massive book. Thankfully, I have only a few minutes to cover them.

Although the word *globalization* itself was not coined until about mid-eighties, academic institutions have been functioning in a global environment for at least five decades. When I first landed at McGill University in Montreal from India as a graduate student some four decades ago, I was surprised to find myself in a global village; staff and students represented some 30 countries; and that was just in the chemical engineering department. The university, of course, boasted of students from over 120 countries. Education and research at universities have always benefited from the exchange and intermingling of people and talent from diverse nationalities, varied cultures with various ways of thinking, etc. Over the recent decades the flow of talent has expanded to a much larger group of first-world countries. In the old days human talent was more mobile than economic resources and flowed in the direction of high finance. Today, finance is more mobile and it flows where the talent pool can be found. Indeed, I distinctly recall meeting with a renowned professor of Osaka University in Osaka, who predicted precisely what we see today way back in 1980, after his return from China which had just opened up to the world around that time. He had recognized the role a large pool of human talent can play in global development.

Let me share a few thoughts about one of my favorite subjects: that is R&D. R&D is often treated as an expense.

In fact, it should be viewed as an investment in the future of the economy. The rate of return on R&D is hard to compute except possibly in an industrial setting. Various economic studies have tried to quantify this return. A rate in the order of 25–30% has been claimed by various studies for industrial R&D in the west. For basic research, almost always funded by governments, the rate of return is very difficult to compute without making some serious unverifiable assumptions. Still, some economists have boldly estimated rates of return that are truly massive, 50% to over 100%.

I am pleased to point out that Singapore, where I have been based since 2000, despite its small population and economy relative to most first world nations, is embarking on an enviable R&D trajectory leading to expenditures as high as 3% of GDP by 2010. More interestingly, it is expected that about two thirds of this outlay will come from industry and businesses. If the 3% goal cannot be attained in a short period it is likely to be due to a faster growth in Singapore’s GDP—a happy problem indeed!

Innovation is central to R&D. While in academia we like radical or revolutionary innovations, industry typically is conservative and prefers incremental innovations. In academia we focus on “R” in R&D while industry prefers to emphasize “D.” Since the timescales of research in academia are much longer than those of industry, there is some incompatibility between the two. The challenge is to bridge the gap and those who succeed can make major impact on the economic returns of R&D. I believe that academic research in engineering cannot continue to follow the old “closed loop” approach, namely, research in academia by academics and for academics.

Even academic research should not be only of “academic” interest; it should have a real-world purpose; it must address a problem that is of medium-term or long-term interest to industry. Of course, there is always a finite degree of risk in any real research. Without risk there is no research needed. Once a problem is solved successfully, there needs to be a mechanism to transfer it to industry for the social good. I think this can occur more readily if industry has a commitment and involvement from get go. Close industry–academia interaction is, in my opinion, the key to success of most engineering research. It is more easily said than done, however. Happily, I am currently involved in directing a Technology Centre supported by the Singapore Economic Development Board and the National University of Singapore that is engaged in carrying out strategic R&D of industry interest in the region.

Finally, may I say some words about my own research area, which indeed led me to interact very closely and vigorously for nearly three decades with the Lodz Drying Group led by Professor Strumillo and with Professor Stefan Kowalski of Poznan University of Technology. I have always been very impressed with the high quality of engineering education and research carried out by the

various Polish universities and I consider myself highly privileged that I have been blessed with such opportunities.

When I started my academic career at McGill University in the early 70s with Professor Murray Douglas as my mentor, we identified the need to develop a more efficient drying section for the massively energy-intensive paper drying section. The paper drying section consumes over 40% of energy used in the papermaking process. With the price of oil in single digits until the first energy crisis of the 70s, there was little incentive to worry about dryers of any kind. However, the sharp increase in the price of oil in the 70s triggered industrial interest in thermal drying. Indeed, aside from initiating research in new paper drying technologies, we thought it was time to get experts together from around the world from all industrial sectors where drying appears as a key unit operation. It turns out it covers almost all industrial sectors from agriculture, foods, pulp and paper, ceramics, wood, to pharmaceuticals. The idea of the biennial International Drying Symposium (IDS) series was born out of this vision. With the oil price now in triple digits, I believe it is high time to revisit all drying operations and try to make them more efficient.

This brings me to my long-standing and extremely fruitful and enlightening collaboration with Professor Strumillo and his associates. He was the key figure who encouraged me to proceed with the IDS Symposium series concept, when I first proposed the idea way back in 1977. He provided me with important contacts in his network. He even provided me with the opportunity to invite and work with several of his bright Ph.D. students, Dr. Tadeusz Kudra, Dr. Zdzislaw Pakowski, and Dr. Stefan Grabowski, to McGill to work closely with me during the 80s. Their presence at McGill opened for me a window to the excellent research in drying being carried out in Poland and also in the former USSR and Eastern Europe. Technical literature from this region far exceeded what was available in English at that time.

I must record with gratitude that a number of contributions I was able to make to industrial drying R&D benefited from outstanding support of academics and close friends from Poland. The list is too long to enumerate here.

Poland is blessed with a large number of very highly reputable world-class universities—some hundreds of years old and others like Lodz Technical University, rather young. Indeed, one thing I have in common with Lodz Technical University is that we were both born in the same year! Your university can be aptly proud of the global impact your esteemed faculty have made in many areas of engineering research in general and in drying R&D in particular. It is therefore an exceptional honor for me to be recognized by your academic community.

As for my own research contributions in drying, they have spanned diverse industrial sectors, from paper, grains, ceramics, food products, to wood utilizing diverse drying equipment. In drying R&D it is important to consider transport phenomena as well as material science. It is necessarily interdisciplinary. In active collaboration with Professor Douglas at McGill, we developed a new superheated steam drying process for newsprint that can also be modified for other paper grades. Although mill-scale dryer can be designed with this concept, we are still awaiting adoption by industry since the dryer section will be radically different from what industry uses today. The advantages of lower net energy consumption and better product quality still cannot overpower the concern of risk in a radical innovation. Maybe it has to wait another decade of escalating fossil fuel costs and legislative restrictions on carbon emissions around the globe. For want of time I shall not discuss other research themes I have been pursuing.

In closing, may I reiterate my gratitude for this exceptional honor your esteemed institution has bestowed upon me today. I shall continue to strive hard to remain worthy of this award!

We would like to take this opportunity to express our great appreciation to Professor Arun S. Mujumdar for his great contributions! We all feel honored and proud of the Doctor Honoris Causa Award of Professor Arun S. Mujumdar. Congratulations, Professor Mujumdar!

*Peng Xu (E-mail: xupenghust@yahoo.com.cn)  
Z.H. Wu, S.M.A. Rahman, A.P. Sasmito,  
J.C. Kurnia, P.H. Joo and K.E. Birgersson*