

CONTRIBUTIONS OF PROFESSOR A. S. MUJUMDAR TO INDIAN ENGINEERING EDUCATION AND R&D

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Prof. Mujumdar initiated his contribution to Indian R&D even as a junior faculty member at McGill University, Montreal, Canada. He contacted the National Book Trust in New Delhi in 1976 about publishing a book series in India to help promote postgraduate teaching and research in the field of transport phenomena viz. fluid mechanics, heat and mass transfer including reactions, combustion etc. He was concerned that lack of foreign exchange at the time made it very hard or even impossible for Indian scientists and engineers to access latest knowledge for R&D and advanced education. The Book Trust connected him with Wiley Eastern in New Delhi to start publication of the hard cover book series entitled Advances in Transport Processes (ATP). The first volume was published in 1980. He then enlisted Dr. R A Mashelkar, who was with the famous National Chemical Laboratory of the CSIR as co-editor to speed up the publication process. Together they attracted high quality of contributions to the ATP series and published 11 volumes in the series; this made advanced literature in transport processes accessible to academics, industry and R&D personnel in India at a cost about one tenth of the US price at a time when India did not have adequate dollar reserves. The quality of ATP series was such that western publishers eventually took over publication of the series as it seemed to exceed the requirements of the Indian market at the time. Later he also published at least four books devoted to Developments in Drying with Indian publishers as the area of drying is a strategic research area for emerging economies.

Prof. Mujumdar has been contributing consistently to many academic as well as research institutes and industries in India. He has delivered many talks in Institute of Chemical Technology (formerly known as UDCT), National Chemical Laboratory (NCL) and numerous industries which includes, L&T, EIL, Kilburn, Sheshasai Paper Mills, United Phosphorous Limited and so on. He also gave free workshops on drying technology at various locations starting in 1984.

Prof. Mujumdar has co-guided many research students in Indian institutes. He has been external examiner for numerous Ph D theses for various IITs, and many universities in India. He has been contributing to many academic libraries in India by donating expensive advanced books and journals over last two decades. This includes the Prof. M. M. Sharma library at the Institute of Chemical Technology which has received a significant number of books and journal volumes over a period of two decades. These books are heavily used not only by faculty members and students but also by industry personnel.

He has promoted industrial Drying R&D in India. Since 1984, he has conducted many workshops on Industrial Drying for industry participants. He has also been involved in organization of many international symposia in India. He is the Founding Chairman of the World Forum for Crystallization, Filtration and Drying (WFCFD) founded at ICT (then UDCT) in 2006. This forum has been actively involved in networking Academia-Industry-Equipment Manufacturers and has successfully organized a number of international workshops. These workshops had more than 80% industrial participation. The 16th International Drying Symposium (IDS2008) was held in Hyderabad, first time in India in the history of the IDS series founded by Professor Arun S. Mujumdar in 1978. This was one of the major event organized by WFCFD and had more than 60% foreign delegates from over 30 countries while remaining participants came from Indian industries. All these conferences have benefited researchers from Indian industries as well as universities. Prof. Mujumdar's worldwide network of researchers in drying and heat and mass transfer has now been connected to active researchers in India. This window of opportunity to access global network of experts for advice and collaboration has been open almost overnight. This has already benefitted academia and industry in India. Many post-graduate students and some faculty members have succeeded in visiting overseas

laboratories (e.g. in Brazil, Finland, Hong Kong, France, USA etc) in drying R&D as a result of connections made by Prof. Mujumdar. While at McGill University Prof Mujumdar accepted and advised postgraduate students for their M. Eng. PhD from II Delhi, IIT Chennai, UDCT (now ICT), BHUIT, BITS etc. He also accepted and mentored at McGill University and at NUS post-doctoral fellows from various institutions in India.

His continuous and dedicated efforts have benefited many Indian institutes to have global reach and networking possibilities in their R&D activities. The detailed information about his contributions to engineering education and R&D in India is given in following table. This does not include the publications he wrote specifically for Indian journals and also supervision of several PhD students from India whom he mentored at McGill University. Indeed the name Mujumdar is associated with Drying all over the globe.

His latest innovation in generating resources that can be useful in India but also all over the globe is the new freely-downloadable book series covering drying, heat and mass transfer, fluidization, mathematical modeling, solar energy, food technology etc. These peer-reviewed, high quality books can be downloaded freely by anyone anywhere in the world at no cost. Prof. Mujumdar has inspired and motivated a number of his mentees to undertake this professional service. This innovation is valuable not only for India but for all nations, both developing and developed.

Table: Contributions of Professor Arun S. Mujumdar to Indian Engineering Education and R&D

1976	visits to UDCT- seminars
1978	Founded the series: Advances in Transport Processes series -after 2nd volume co-edited with Dr. R. A. Mashelkar 11 volumes, to promote R&D in India and make technical info available at low cost when foreign exchange was unavailable
1982	Indian Institute of Chemical Engineers (IChE) Keynote Lecture in Pune
1982	Visiting Professor at NCL, Pune

	Seminars at several CSIR labs, IITs, ATIRA, Industries (includes L&T, EIL, Kilburn ,SS Products , P& P mills, United Phosphorous Limited etc)
	Workshops for industry (1984, 1987, 1993 in Mumbai, Delhi) UDCT (2 times) individual GP Kane Lecturer, UDCT, Mumbai Several workshops sponsored by industry.
2001	Workshop on Industrial Drying at UDCT, Matunga
2001	Joint Indian Heat Mass Transfer Conf and ASME Conf, Kolkata, Keynote Speaker
2002	Keynote at Chemcon, Chennai
2004	International Workshop and Symposium on Industrial Drying, IWSID2004
2005	Organized Asia Pacific Drying Conference at Kolkata with CMERI (CSIR) ADC05
2006	Chairman and Founder Member of International Forum for Crystallization, Filtration and Drying WFCFD
2006	Principle Speaker, 1st International Workshop on Crystallization, Filtration and Drying
2007	Principle Speaker, 2nd International Workshop on Crystallization, Filtration and Drying
2008	Principle Speaker, 3rd International Workshop on Crystallization, Filtration and Drying
2008	16 th International Symposium on Drying (IDS2008) , 350 attendees from 30+ countries. IDs series founded/chaired by Prof. Mujumdar since 1978.
2008	Guide to Industrial Drying, Editor Arun S Mujumdar, published in India, 2004 and 2008.
2009	Keynote speaker in two conferences at Banaras Hindu University (BHU)
2010	Principle Speaker, 4th International Workshop on Crystallization, Filtration and Drying, Mumbai
2011	Keynote Lecture: Recent Developments and R&D Opportunities in Food Dehydration, Indian Institute of Crop Processing Technology (IICPT), Thanjavur, Tamil Nadu,

	India, December 2011.
2012	Keynote Lecture First NITTEM Conference on Food Processing, New Delhi, India December 2012
2012	Keynote Lecture: Advances in Drying Technology, 7 th WFCFD, Mumbai, India February 2012.
2013	Dr. Balwant S. Joshi Distinguished Visiting Professorship Lecture on Industry-Academia Interaction in R&D - A Personal Perspective at Institute of Chemical Technology, Mumbai, India
2014	Appointed as Emeritus Professor at NIFTEM, Kundli, India
2014	Organized workshop for academics and industry on food dehydration. March 2014
2014	Collaborative work on Spray Drying at NIFTEM, Kundli, India
2015	Keynote Lecture: NIFTEM, Kundli, India
2017	Collaboration with NIFTEM, Kundli, India (Editing books on drying)

In summary, Prof. Mujumdar's contributions have been duly recognized by his alma mater which named him Platinum Jubilee Professor in 2008. He helped one of us (BNT) develop Advanced drying Laboratory at UDCT (ICT). Also, global contacts and networks were developed between ICT and numerous universities and industries as a result of Prof. Mujumdar's direct involvement. In 2009 he was honored by presenting him with the Platinum Award of ICT which now has Deemed University status. Recently he has been named Adjunct Professor by the Indian Institute of Crop Processing Technology (IICPT), Thanjavur, Tamil Nadu and Professor Emeritus by NIFTEM, Kundli, India.