

Chintamani Mande (1925–2021)

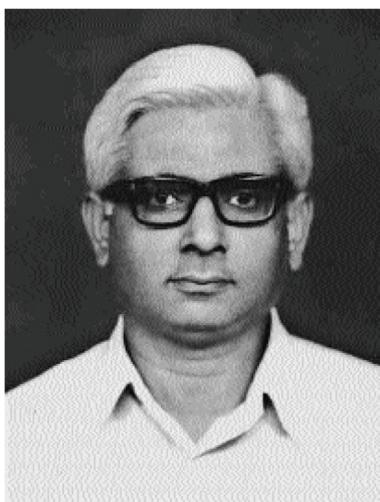
Professor Chintamani Mande, a well-known researcher in the field of X-ray Spectroscopy and Solid State Physics, an educationist and an excellent teacher, passed away at the residence of his son, Shekhar Mande (Director General, Council of Scientific and Industrial Research and Secretary, Department of Scientific and Industrial Research), in New Delhi, on 27 April 2021.

Chintamani Mande was born in Nagpur on 28 October 1925. He had his school education in Gorakhpur, a city in eastern Uttar Pradesh. He joined the Banaras Hindu University and obtained B.Sc. degree and later completed M.Sc. in Physics from the same University in 1947. He served as a lecturer in Physics at St Andrews College in Gorakhpur from 1947 to 1949. He shifted to Allahabad to work in a research scheme, funded by the Council of Scientific and Industrial Research. He worked on problems in X-ray emission spectroscopy, particularly, on the forbidden lines in the L spectra of platinum and mercury. For his thesis entitled 'Some studies in X-ray spectra', he obtained D.Phil. degree from the Allahabad University in 1952 under the guidance of G. B. Deodhar. He later went to Paris in 1953 as a scholar of the National Centre of Scientific Research where he worked with Y. Cauchois, a world famous X-ray Spectroscopist. He carried out X-ray spectroscopic studies of gold–silver and gold–palladium alloys covering a very large spectral domain of about 0.5 \AA to more than 5.5 \AA and therefore necessitated the use of various techniques relative to spectroscopy by transmission in air as well as by reflection from curved crystals in vacuum – a work which demanded a great deal of dexterity and patience. He was awarded D.Sc. degree by the University of Paris in 1958 with mention 'Very Honourable'. He had written his thesis, entitled 'Contributions to the study of gold, palladium and their alloys by X-ray spectroscopy', in French.

Mande returned to India in 1958 with an innate desire to help the motherland in its scientific growth. He worked as a Research Officer in the Spectroscopy Division of Bhabha Atomic Research Centre till 1961. There he established facilities for X-ray spectrochemical analysis and research work related

to the atomic energy programme in India.

As his primary love was research as well as teaching, he joined the Physics Department of Poona University in 1961 as a Reader where he established an X-ray research laboratory. He started teaching of X-rays as a special subject in M.Sc. A teaching laboratory was also developed by designing and fabricating X-ray spectrographs and diffraction cameras. Six students obtained their Ph.D. degree under his guidance for their theoretical and experimental work related with the chemical effects in X-ray spectra.



He joined Nagpur University in 1967 as Professor and Head of the Post Graduate Teaching Department of Physics which was started in 1963. The Department moved to its present building on the University Campus in July 1969. Soon the various research activities were started in the Department. Apart from X-ray Spectroscopy, Mande promoted research programmes in Nuclear Magnetic Resonance, Ultrasonics, Luminescence, Atmospheric Physics, Materials Science, Electronic Instrumentation, New Energy Resources, etc.

Mande and his wife, Latika Mande, were instrumental in starting the Department of Foreign Languages in the Nagpur University. They both taught French for several years.

Mande, with an active support from his colleagues, organized Summer Institutes in 1968, 1969, 1971 and 1972 for college teachers. The last two were special All India Summer Institutes meant

for adapting the Harvard Project Physics Courses to Indian conditions. In this connection he went to the USA in 1969 on invitation from the National Science Foundation to study the science educational projects in that country. With the assistance from UGC a project physics laboratory was built up in which were displayed demonstration experiments and other educational aids designed and fabricated by the faculty members and participants in the summer institutes.

Realizing the importance of popularizing science, the Department organized science exhibitions, sky watching, science films and popular science lectures for a few years during 7–14 November, a week bracketed by birthdays of Sir C. V. Raman and Pandit Jawaharlal Nehru. Establishment of the Raman Science Centre in the city by the National Council of Science Museum is an outcome of that.

A physics study group of the National Council of Educational Research and Training worked in the Department from May 1970 to June 1973 under the Directorship of Mande. The group prepared for the VIII to the XI classes of Higher Secondary Schools, the topics on mechanics, wave motion, optics and properties of fluids. Text books for classes VIII and IX have been printed by the NCERT.

Under his leadership the Department carried out the University Leadership Project from 1974 to 1982 with a view to improve physics education in the undergraduate colleges affiliated to the Nagpur University. The project was financed by the University Grants Commission. In this project, the B.Sc. syllabi were modernized and suitable course materials were produced by experienced teachers. Hands-on training was given to the teachers during the summer institutes organized for the purpose. The teachers were allowed to take away the equipment fabricated by them to their institutions. This gave them the necessary confidence to repair and maintain the laboratory equipment. A contact programme was started in which senior physics teachers visited the affiliated colleges and interacted with the students in the mofusil areas. Mande visited Penang University in Malaysia in 1977 as a representative of the UGC for attending the South-East Asian Regional Conference on Physics Education.

PERSONAL NEWS

Chintamani Mande built a research school of international repute in the field of X-ray Spectroscopy. Work was carried out in both theoretical as well as experimental areas.

The isotope and nuclear finite size shifts and the screening doublets in X-ray spectra were calculated using the effective nuclear charge. The screened hydrogen like wavefunctions have been used to calculate the electron shake-off probabilities in β decay, Auger electron energies and the energy separation of the $K\beta$ satellites. Theoretical calculations of the transition rates of the forbidden lines in X-ray spectra have been carried out. These calculations were helpful in the classification of the spectral lines. Raman scattering in the X-ray region was investigated.

Studies of chemical effects on X-ray absorption spectra were carried out using the measurements of chemical shifts and shapes of the main absorption discontinuities, and the near edge (XANES) and the extended fine structure (EXAFS) associated with them. Several materials like spinels, intermetallic binary and ternary chalcopyrite semiconductors, superconductors, tungstates, etc. were studied to obtain information on the effective ionic charges, ionic radii, ionicities, valencies of transition elements, etc. Mande's meticulous attention to detail and ways in analysing data always led to new revelations and discoveries. A

large number of papers/articles, which are widely referred, were published in reputed research journals. About 40 students obtained their Ph.D. degree under his guidance.

Mande along with Bonnelle of Paris edited a book *Advances in X-ray Spectroscopy*, published by Pergamon Press in 1982. It carries a foreword by Francis Perrin, a French High-Commissioner for Atomic Energy from 1951 to 1970, and an introduction by Nevil Mott, a Nobel Laureate (1977).

Mande retired from Nagpur University on 31 October 1985. He was later invited by Goa University to join as Professor and Head and develop the recently started Department of Physics. He served there from 1987 to 1991. Thereafter he returned to Nagpur, the city he loved most.

Mande received several awards and fellowships. He was a Fellow of the Indian Academy of Sciences (Bengaluru) and also that of the National Academy of Sciences (Allahabad). He was a founder Fellow and President of the Maharashtra Academy of Sciences. He was a UGC National Lecturer during 1980–81. He received the Best Teacher Award of the Maharashtra Government in 1983. He was President of the Physics Section of the 67th session of the Indian Science Congress Association held in Calcutta in 1980 and also President of the Indian Association of Physics Teachers during

1986–87. In 1987 he got the National Prize for Instrumentation given by the Instrument Society of India. He was felicitated by the Marathi Vidnyan Parishad as Outstanding Scientist in 1981. He was a member of the National Advisory Committee of the Inter University Consortium for the Department of Atomic Energy Facilities established by the UGC in Indore. He was a member of the UGC's Committee for the revision of pay scales of University and College Teachers. For several years he was associated and also worked as Chairman of the Centre of Science for Villages at Wardha.

Mande was an avid reader with a deep interest in the history of science. Painting was his hobby which he continued almost till the end.

When we deeply mourn the loss of an inspiring teacher and an outstanding academician, our solace is that he will be remembered as a role model for the present and future generations of students in general and X-ray physicists in particular.

He leaves behind his wife (Latika Mande – passed away on 5 June 2021), daughter (Veena Gokhale) and son (Shekhar Mande).

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