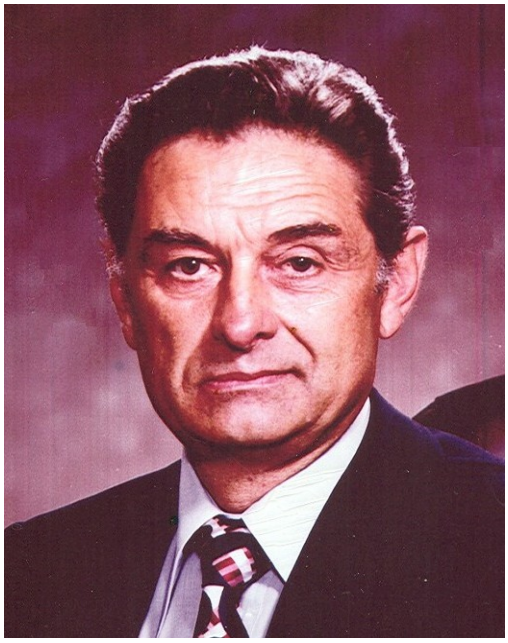
Life devoted to science



The great Bulgarian scientist Jordan Malinowski was born on June 3, 1923 in Sliven, Bulgaria. He studied in the American college in Sofia and after graduation in 1943, took part in the World War II and was awarded a medal. In 1948 he graduated the Faculty of mathematics and physics with specialty "Chemistry" in Sofia State University "Kliment Ohridski" and worked as a research associate in the field of physical chemistry. From 1948 up to 1958 he was a research associate in the Institute of Physics to the Bulgarian Academy of Sciences (BAS). He got his PhD degree in chemistry in 1958 and his Doctor of Science degree in 1969. In 1959 he was elected associated professor, and in 1964 – professor in the Institute of Physical Chemistry to BAS. In 1989 he was elected academician of BAS. He was a founder of the Central Laboratory of Photoprocesses to BAS (1967) being its Director up to 1992, when he was elected President of BAS. He remained on this high position till the end of his life in 1996.

Academician Malinowski started his research activities in 1950 as an assistant in the Physical - Chemical department at the Physical Institute of Bulgarian Academy of Sciences. He soon obtained essential results on the physical ripening of the photographic emulsions. Besides, he worked out a method for differential development, which allowed the obtaining of photosensitive materials with improved characteristics and better performance. Subsequently, this method has been widely used by the many specialized laboratories for a long time.

Further, Malinowski's interest was directed towards studying the elementary processes in silver halides leading to the formation of a "latent image ", i.e. the invisible Ag clusters, formed initially on illumination of the photosensitive material, which is consecutively visualized by chemical or physical development. Until then, the theory of the photographic process was based solely on the electron-ionic stage of light quanta. The role of the "defect" electrons, the so-called "photoholes", formed simultaneously with the photoelectrons, remained entirely obscure. To clarify this problem Academician Malinowski developed a unique experimental method allowing studying quantitatively the physical characteristics of the photoholes: mobility, free drift, mean lifetime, etc. The results obtained led to the conclusion that the role of the photoholes in the photographic process could not be neglected. The investigations allowed further development of the theory of the photographic process, which became well-known in the international scientific literature as a "symmetric scheme of Malinowski". This remarkable study is now world widely accepted as the most essential scientific achievement of Jordan Malinowski. Moreover, using these theoretical concepts, Acad. Malinowski developed a new photoprocess based exceptionally on the formation of photoholes by illumination of the photosensitive material and further interaction with metal atoms coated on the light-sensitive surface by vacuum evaporation. The research performed in his Laboratory revealed that such a process can be carried out in a number of photosensitive materials, including non-silver ones.

Furthermore, new profound knowledge on the essence of the photoprocesses was obtained by Acad. Malinowski and his co-workers by applying vacuum-evaporated layers of silver halides as an adequate model of the complex photographic emulsions. This gave access to numerous aspects of the widely used, but still not completely clear,

conventional photographic process. Thus, the action of sensitizers (substances increasing the sensitivity of the photographic material) was elucidated by representing them as traps for photoelectrons and photoholes. The process of development of illuminated emulsions was modeled and it was shown that its mechanism can be regarded as a special case of the theory of crystal growth. Moreover, the longstanding systematic research made possible clarification of the photographic process also in others photo-sensitive materials, including non-silver compounds.

With a view to the above, it is noteworthy that there were papers which brought to two of the Malinowski's PhD students the prestigious Egert award - the highest award of the Swiss Polytechnic for young scientists working in the field of photography. In these works experimental studies are combined with the use of modern for its time computing and simulation methods. The results obtained allowed to conclude that most probably the centers of the latent image in the silver halides consist of about 10 atoms of silver. This statement was subsequently confirmed by data from Monte Carlo simulation of the mechanism of the photographic process. Today, these results and experiments still arouse admiration taking into account the boldness of Acad. Malinowski and his students to investigate nanosized objects by available at about 40 years ago apparatus and chemical methods. Remarkable! The original methods applied for experimental studies of the photographic process, the precisely built experimental equipment, and the knowledge attained on the formation, growth, and properties of the vacuum deposited layers allowed the development of novel photographic materials with extreme resolution by evaporation of various photosensitive substances on flexible and glass substrates.

For the practical realization of these projects, pilot lines were designed and built in the Central laboratory of Photographic Processes and a small scale production of various photographic materials was organized. During the years more than several thousand different encoders, tachometric sensors and raster discs were manufactured and sold in industry. Practical implementation of the pioneer achievements of Academician Jordan Malinowski made possible organization of a totally new for Bulgaria high-tech field, namely production of photo-raster transducers. This made possible the creation of a new industry in the country – the production of photo optical transitional transducers including as a basic element the high precision gratings manufactured in the Malinowski's Laboratory. The transducers are built in most products of machine building, electronics and robotics applying digital program control.

Academician Jordan Malinovski was widely recognized all over the world. He was an honorable member of the Royal society of the United Kingdom, of American and Japanese societies for photographic science and technique, of European Academy of Sciences, art and literature, of Academy of Valonia in Belgium etc. He was awarded numerious national and international awards as the medal of the German Academy for Natural Sciences, Lieven-Gevaert Medal – the most prestigious award of American society for photographic science and technique, award for the best paper of the year of the American journal for photographic science and technique (2 times); Dimitrov award; decorations "Republic Bulgaria" – III degree, "Cyrill and Methodius" – II degree, medal "1300 anniversary of Bulgaria", medal "100 years BAS" etc. Many years he was a member of the International committee for photographic science and editor in prestigious international journals. As an outstanding scientist he was invited to deliver keynote lectures at all international congresses and symposia in the field of photographic processes.

As a president of BAS Academician Jordan Malinowski has worked fruitfully to reform the Academy. He has made a lot of efforts to keep and strengthen the leading position of BAS in the scientific community of Bulgaria and Bulgarian society. Today we, as his heirs and disciples, united in the newly created Institute of Optical Materials and Technologies, are striving to follow and elaborate the ideas of our Patron. Refer to his vision about the organization of the scientific work: "**There is no Bulgarian science, science is global, with global criteria and requirements. Science is not divided into fundamental and applied – there is science and application of science".** How relevant are these words of Academician Malinowski today, when in European and global science the tendency to combine scientific and application activities is steadily on top of the agenda. This is also the flagship line of Scientists in Bulgaria in their efforts to help building a society and economy in our country, based on knowledge!

The brief memory of the life and scientific work of our patron Academician Jordan Malinowski today makes us feel lucky to have the opportunity to be his disciples, collaborators and followers, and to be proud of his scientific achievements, won the undisputed international prestige of Bulgarian science. Celebrating the 90th anniversary of his birth we would like to extend with love and deep respect:

Thank you, Teacher!

Assoc. Prof. Julita Dikova, PhD

Scientific Secretary of the Institute for Optical Materials and Technologies