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## RUSTAM DEBERDEEV. 50 YEARS IN SCIENCE

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Professor Rustam Yakubovich Deberdeev was born in 1940 in Arsk city, Tatarstan. He finished a secondary school in 1958 in the city of Naberezhnye Chelny and used to work as a metalworker and a driver. He served in the army and entered the Kazan State Technological University after its completion in 1962. (formerly titled as the Chemical and Technological Institute).

R. Deberdeev graduated from the University in 1967 and succeeded in positions of a laboratory staff member, engineer, junior researcher, assistant professor, associate professor and finally a full professor. He has been heading the Chair of processing technology of polymers and composite materials since 1990.

R. Deberdeev defended his master degree thesis (Ph.D.) in 1972. Later on in 1988 he defended his thesis for Doctor's degree. He obtained the academic rank of a professor in 1990.

Professor R. Deberdeev is the recognized specialist in synthesis of monomers, oligomers, polymers and composite materials, development of processing technologies such as energy-and-resource saving and eco-friendly technologies.

He supervised both fundamental and applied research works concerning the influence of physical and chemical structure of components on the performance of anticorrosive coatings and constructional items based on thermoplastic and thermosetting polymers. These works have resulted in working out new corrosion prevention-targeted materials to protect pipelines, water treatment equipment of thermal power plants, chemical equipment, production accessories etc. His materials and technologies were successfully introduced into facilities of the Department of Energy in the former USSR, JSC "Pigment" (Saint-Petersburg), Almetievsk pipe plant, JSC "Kamaz" (Naberezhnye Chelny), production association "Elaz" (Elabuga-city), JSC «Nizhnekamskneftechim» (Nizhnekamsk), JSC "Orgsintez" (Kazan), JSC "Novotec-polymer" (Novokuybyshevsk) etc. between 1980 and 2008.

In the recent years the research works of Prof. R. Deberdeev have mainly been focused on unconventional approaches to synthesis of monomers, oligomers and polymers and to working out energy- and resource saving conditions. He has worked out technical solutions for

industrial level production of ethylene-propylene copolymers based on the new approach to the behaviour of rapid chemical reactions and movement of interacting media in a restricted volume. The production technology was deployed in the synthetic caoutchouc facility of JSC «Nizhnekamskneftexim». R. Deberdeev has also contributed to working out of the technology allowing to produce the brand-new divinyl synthetic rubber. This technology has been successfully deployed at JSC «Nizhnekamskneftexim» Production capacity is 100 000 tons per year. The production process of halogenated elastomers, which is brand-new for world science and industry, has been worked out. It is based on mixing intensification of emulsions or solutions in a restricted volume, promoting greatly the rate at which a desired product is produced. The specific features of this technology are resource and energy efficiency, ecological safety and compact technological equipment.

Another research is carried out in the field of synthesis of N-oxides and aromatic C-nitroso compounds and their application in composite systems as radical process initiators, various modifiers with promising application prospects including low-temperature systems for vulcanization of composites based on unsaturated rubbers. The research resulted in estimations of the dependency between the structure and the vulcanizing activity and interpretations of thermo decay of vulcanizing agents, vulcanization stage mechanisms and the development of corresponding composite materials.

The evolution of a society sets new challenges for chemical industry even in well-known and robust technology areas such as polyvinylchloride composites. Research works carried out in the course of recent years provide ways to create metal-containing greases, plasticizers and multifunctional stabilizers for PVC compositions. The behavior of such materials in the new eco-friendly compositions and related materials has been analyzed. The technologies developed to obtain multifunctional additives are resource-saving and widely applied in production industry.

R. Deberdeev has created and patented the new unique and simple process for polymer processing

technology in the recent years. It deals with production of marked polymer piping through controlling the rough tube bar in the viscous flow state and the marking ribbons in the rubber state.

The example of interesting research of the group under his supervision is the creation of a brand-new energy- and resource-efficient green technology of polymeric sulphur synthesis with some principal differences from the existing ones. The molten sulphur is dispersed to the nanoscale state and then polymerized into a macromolecular chain with new properties. The implementation of this technology will allow to obtain a worldwide priority and unlimited polymeric sulphur production capabilities.

The field of study of R. Deberdeev which also attracts interest is devoted to synthesis of polymer composite electrets from large-scale industrial polymers such as polyethylene, polypropylene, polystyrene and ethylene-propylene copolymers etc. He has worked out theoretical models of electret composites and was the first one to separately estimate parameters of homo- and heterocharges, to find high-temperature relaxation agents and other examples and law patterns of their behaviour, which stipulate performance and durability of various electret composites. Composite electrets have been synthesized and tested. Their large-scale application will allow, in some cases, to exclude addition of preserving agents into food products thus improving the ecology of a human living environment.

Lateral thinking of R. Deberdeev and his connections with Russian science schools allow him to provide target-oriented training of the chemical technology engineers. He has concluded collaboration agreements in

the field of education and staff training with the Institute of Chemical Physics by N.N. Semenov, Institute of Problems of Chemical Physics (Chernogolovka city), Institute of metal-polymer systems (Gomel city, Belorus), JSC «Polymiz» (Kazan), JSC «Orgsintez» (Kazan) *et al.* The department under his supervision is at the top of the Russian Federation rating of the final training university departments providing graduates specialized in «Processing technology of plastics and elastomers» and «Technology and design of packing materials».

The studies of R. Deberdeev inspired transition to the new research area in the Kazan State Technological University – modelling and designing of technological processes for synthesis of oligomers and polymers. He supervised more than 25 Ph. D. and 3 D.Sc.

Professor R. Deberdeev is the author of more than 350 monographs, textbooks and articles published in such journals as «RAS reports», «Macromolecular compounds», «Plastic masses», «Journal of Polymer Science», «International Journal Polymeric Materials», «Russian Polymeric News» *et al.* His developments are protected by more than 100 patents and author's certificates.

R. Deberdeev has been the head of a group with similar scientific interests for many years. This group provides solutions for urgent scientific and technical challenges of national industry.

R. Deberdeev is socially recognized both in science and education and has such honours as the «Honoured scientist of the Republic of Tatarstan and the Russian Federation», the laureate of the Republic of Tatarstan State Award, and the Award of the Russian Federation Government. He is honoured by certificates of the American Bibliographic Institute for outstanding successes in research activities.