

PROF. DSC YACHKO IVANOV,
MEMBER OF THE BULGARIAN ACADEMY OF SCIENCES, AND
HIS REMARKABLE SCIENTIFIC CAREER

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ABSTRACT: Academician Yachko Ivanov turned 90 in September 2022. We are pleased to present a short interview with the jubilee outlining the basic achievements of his remarkable scientific carrier.



Academician Yachko Ivanov was born in 1932. He graduated from Odessa University of Civil Engineering (Odessa, Ukraine) with M.Sc. in hydraulic engineering, and he enrolled in doctoral studies at the Czechoslovak Academy of Sciences (today's USTRACH, Bratislava, Slovakia) defending there his Ph.D. thesis in rheology. He took the position of associate professor at the Institute of Technical Mechanics (ITM), Bulgarian Academy of Sciences (BAS), in 1972. Academician Ivanov defended a D.Sc. thesis in 1988 when working at the Central Laboratory of Physico-chemical Mechanics (CLPhChM), BAS, where he became full professor two years

later, in 1990. He was consecutively elected as a Corresponding member and Full member of the Bulgarian Academy of Sciences in 1995 and 2003. He has received the Doctor Honoris Causa title of Luben Karavelov University of Structural Engineering and Architecture (VSU), Sofia, in 2006, and of the European Polytechnical University (EPU), Pernik, in 2015.

Academician Ivanov specialized at the Research Institute of Concrete and Reinforced Concrete named after A.E. Desov, Moscow, Russia, and at the Institute of Architecture and Construction, Czechoslovak Academy of Sciences, Bratislava. He was also a scholarship holder at the Laboratory of Concrete and Cement Study, Institute for Art and Crafts, France, under the patronage of Mr. U Thant, United Nations Secretary-General at that time.

He gained international recognition by authoring and co-authoring more than 300 scientific papers, five monographs and textbooks, four manuals, and four industry standards, also holding eleven patents. Academician Ivanov delivered numerous lectures at universities and research institutes worldwide.

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Academician Ivanov, your scientific carrier is closely related to rheology. Hence, our first question is how and when did you focus on that research area? What are your achievements in the field? Tell us something more about that branch of science.

Rheology is part of mechanics treating flow and deformation of continua under external loading. It is close to physics, chemistry, and mathematics. My interest in rheology and physicochemical mechanics arose early during my university studies when I attended the lectures and seminars of the renowned Russian scholar Pjotr Alexandrowitsch Reh binder. I closely collaborated with scientists from the Institute of Physical Chemistry, BAS, and personally with Academician Rostislav Kaishev. I also collaborated with the team of Academician Reh binder at the Institute of Physical Chemistry, Russian Academy of Sciences (RAN), the group of Profesor Mason at McGill University, Montreal, Canada, and the Pulp and Paper Research Institute of Canada. Those contacts attributed to my qualification. Note that modern molding of plastics and rubber is inconceivable without profound knowledge on rheology. Note also that rheology is involved in the food industry, pharmacy, construction, medicine, and many other areas. My results generally concern composite materials, especially the rheology of liquid-disperse silicate, polymer and pharmaceutical composites. My research team emerged initially at the Central Laboratory of Physico-Chemical Mechanics, BAS. It later transformed into the department "Rheology of Concentrated Dispersed Systems". I headed a team dealing with problems not popular at that time, namely the effect of the solid dispersed phase on the system's flow and deformation,

the effect of particle size, interactions, and tendency to agglomerate, and the possibility of system properties control by adding nano-mixes. So to say, those were pioneering studies, and the approach employed was named “micro-rheological approach”. Part of the results is presented in the monograph *Composite Materials: Interphase Phenomena and Processes*, Kluwer Acad. Publishers, Dordrecht, The Netherlands 2001, and it is still recognized and cited.

You are the organizer and founder of societies, seminars, and conferences. Please tell us which activity you mostly like.

I am one of the founders of the European Rheology Society, a longtime member of its managing body (1984–2010), and one of the organizers of the European Conference on Rheology series. I also organized and managed a popular national school on rheology (1973–1994), which later grew an international meeting. I was the chief organizer of the International Conference on Mechanics and Technology of Composite Materials, and managed the conference series “International Conference on Design and Construction of Buildings and Facilities” during the last 30 years. Note that the latter meeting brought me professional satisfaction and joy, and I regularly participate in the event with presentations and communications. I am a member of the International Committee of Rheology, the American, English, and French rheology societies, and the European Academy of Science and Arts, Salzburg, where I was recently awarded a prize for an outstanding scientific carrier.

Which are your most valuable accolades and awards?

I received numerous awards during my carrier. I value all of them bringing me positive emotions and wonderful memories. I will mention some of them without underestimating those not listed below, and I am especially thankful to my colleagues for the appreciation of my work and academic merits:

- “Academician P. A. Rehbinder” medal of Russian Academy of Sciences (1978)
- Bulgarian State Committee for Science and Technology Award (1978)
- Bulgarian Order “Saints Cyril and Methodius” (1982)
- Bulgarian Academy of Sciences Award (1982)
- Odessa University of Civil Engineering Jubilee Medal (1982)
- Gold Medal of Bulgarian Union of Scientists (1984)
- Russian Ministry of Science and Education Award (1989)
- Bulgarian Union of Scientists award (1993, 2002)
- Medal of the University at Douai, France (1994)

- Kharkiv State University medal and gold medal (2010, 2019)
- “Professor Marin Drinov” gold medal of the Bulgarian Academy of Sciences (2002)
- “Professor Assen Zlatarov” gold medal (2003)
- ”Kolyu Ficheto” gold medal (2002)
- Honorary medal of Municipality of Montana(2022)
- Honorary member of Bulgarian Union of Scientists, Bulgarian Technical and Scientific Union, Bulgarian Technical and Scientific Union of Civil Engineering and of National Club of Civil Engineers - Veterans (2003)
- Dr. Honoris Causa of the VSU “L.Karavelov”
- Dr. Honoris Causa of the European Polytechnics University
- Honorable citizen of Montana (2022).
- Badge of honor of the Director of BAS (2022)

I have been a foreign member of the Serbian Engineering Academy since 2021. The Senate of the European Academy of Sciences and Arts (ASA) elected me as an academy member, class VI – Technical and Environmental Sciences (18.03.2022), which is my newest accolade. The President Prof. Dr. Klaus Meinzer gave me the diploma during an official ceremony held in the Large Aula of the University of Salzburg.

Will you give us more details about your scientific and professional expertise?

My participation in council boards started in 1972. I was a member of the Specialized Scientific Council on Building and Insulating Materials at the Higher Attestation Commission till its closure, and a two-term member of the Specialized Scientific Council on Mechanics. Note also my membership in the Scientific Council of CLPhChM, 1972-1993, the two-term membership in the Scientific Councils of the Institute of Mechanics, BAS and the Building Materials Research Institute, and the one-term membership in the Specialized Scientific Council on Polymer Chemistry and Technology. Moreover, I have also been a member of the Academic Council of EPU since 2011. Internationally, I have participated in the Scientific Council of Computer Modeling at the International Engineering Academy, and in the Strategic Scientific Board of the Global Institute for Energy, Environment and Sustainability, USA, since 2014.

My participation in 23 editorial boards of scientific journals is also noteworthy, namely: *Mechanics of Time – Dependent Materials* (KLUWER Acad. Publ., now Springer); Series “Working and Engineering Environmental Protection (University

of Nis, Serbia); Journal of Material Sciences and Constructions (Serbia), Modeling and Optimization in Material Sciences (Odessa State Academy for Construction and Architecture, Ukraine); Comptes rendus de l'Académie bulgare des Sciences; Theoretical and Applied Mechanics; Series on Biomechanics (Editor-in-chief); Journal of BAS (Editor-in-chief); Engineering Sciences (Deputy Editor-in-chief and Editor-in-chief); Construction; Innovations, and many others.

I have been a scientific representative in numerous expert commissions and councils. These are for instance the Commission on Structural Engineering, Architecture, Geodesy, and Mining at the Higher Attestation Commission, the Scientific and Expert Commission on Mathematics and Mechanics, and the Higher Scientific and Expert Commission on Engineering. I also chaired the commission attesting institutes of the Engineering Branch of BAS. Note also my membership for more than ten years in the Commission for Outstanding Research Results at the Union of Scientists in Bulgaria (USB). Currently, I chair the Commission of Eureka Foundation awarding the "Young inventor" prize and the student scholarships named after Academician Balevski, Academician Mishev, and Kolyo Ficheto.

I also chair the Commission on Structural Engineering in Bulgaria at the Scientific-Technical Union (CSTUSEB). It awards the National Prize "Kolyo Ficheto" to the best diploma projects of B.Sc. and M.Sc. graduates in structural engineering, and the National Prize "Young constructor – Kolyo Ficheto" to the best construction technician. I have participated for more than 10 years in the National Board assisting the national business, science, arts, culture, and education. I am also a member of the Consulting Council of the National Academic Network at the Office of the President of BAS, chairing the Commission of the Regional Representative -Sofia awards at the Construction Chamber in Bulgaria (CCB), and participating in the CCB Commission for registration, handling, and usage of the professional register of constructors.

Your tireless public activity is popular among colleagues, friends, and acquaintances. We are also aware of your initiative for financial support of young researchers in mechanics. Will you tell us something more about your efforts?

I am a chair for more than 17 years of the Mechanics Department at the Union of Scientists in Bulgaria. I was a two-term chairman of the Eureka Foundation, which supports financially young and talented researchers in various scientific fields. Since 2001 I have been the chairman of the Scientific-Technical Union on Construction in Bulgaria. I was also a member of the Managing Body of the Bulgarian Science Fund. Currently, I am a member of the Managing Council of the National Club of Constructors- Veterans. I am one of the founders of the foundation "Humaneness", and I was a long-term member of the Managing Council of the Federation of Knowledge-Disseminating Societies. I initiated and chaired the Bulgarian Rheology

Society, and I am a member of the Initiative Committee for the restoration of the Pliska large basilica.

As Director of the Academic Publishing House “Marin Drinov”, I initiated a donation campaign to erect the monument to Professor Drinov without spending any public or BAS funds. The fundraising was successful due to my contacts with members of our community.

Since 2019 I have been a member of the Initiative Committee for mounting a commemoration plate of Eng. Ivan Ivanov in the village of Mala Tsarkva, the starting point of the Rilla aqueduct to Sofia, whose construction was done by Eng. Ivan Ivanov. Since 2022, I am a member of the Initiative Committee and one of the donors for the erection of a monument of Kolyo Ficheto in Sofia.

To support young researchers in mechanics, I initiated ten years ago the national prize “Best young scientists in mechanics” to be awarded by the National Committee of Theoretical and Applied Mechanics, and I still finance it. A special commission appointed by the Scientific Council of the Institute of Mechanics nominates the best candidate. If approved, the awardee delivers a scientific lecture.

My charity work focuses on the financial support of Ph.D. students, young scientists, students, and schools in my native land.

You treated various topics in your lectures. Your teaching practice started long ago in 1967. Will you specify the courses most appealing to you and your students?

I will start with the rheology course taught at the National Institute for Health Investigations in 1967. I taught “Building materials” at the Institute of Civil Engineering (now University of Architecture, Civil Engineering, and Geodesy), 1973-1983, and “Polymer composites” at the Technological College, Razgrad, till 1988. I also taught “Highly concentrated dispersed systems” for M.Sc. students at the University of Chemical Technology and Metallurgy (UChTM) in 2002 and 2005. “Introduction to civil engineering” and “Special composite materials” were courses taught in English at the EPU, 2011–2022, while “Microrheology of highly concentrated dispersed system” – at the BAS Training Center.

Twenty-one Ph.D. students successfully defended their theses under my supervision, while seven students were from foreign countries. I have supervised many graduate students from UChTM, Sofia University “St. Kliment Ohridski”, and Technical University-Sofia.

I taught “Microrheology of structured dispersed systems” at McGill University, Montreal, Canada, “Rheology of liquid polymer composites”, and “Durability of polymer composites and materials” at Ecole Nationale Supérieure des Mines de Douai, France. More than 40 universities and institutes in Europe, America, Australia, Asia, and Africa invited me to deliver lectures on “Rheology of intelligent materials”.

Do you hold patents?

I am the owner of four patents and seven innovations. Tiles for cladding canals of the irrigation systems of the former Vidin district and canals in Hungary are in production pursuant to a patent of mine. Polymer concrete products are in use in the Medet Mining and Processing Complex and with an economic effect exceeding 2,5 million levs.

Monographs, scientific books, textbooks and manuals authored by you and issued in Bulgaria and abroad?

The number of my scientific papers published in Bulgaria and abroad exceeds 250. I have also authored four chapters in monographs. The delivered scientific lectures are more than 150, and about 30 of them are plenary lectures. Citations of my works are about 1500.

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