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Obituary: Peter A. Kralchevsky

On December 5th, 2020, we lost Prof. Peter Kralchevsky – a Bulgarian scientist with remarkable achievements in the area of colloid and interface science, secretary of the European Colloid and Interface Society (ECIS), member of the international Council of the International Association of Colloid and Interface Scientists (IACIS), and elected member of the Bulgarian Academy of Sciences (since 2012). He was also a member of the Editorial Board of the journal Advances in Colloid and Interface Science.

Peter Kralchevsky was born on 23th October 1956 in the town of Gabrovo, Bulgaria. He graduated with honors a specialized high school in mathematics in Gabrovo and, afterwards, the Faculty of Physics of Sofia University "St. Kliment Ohridski" with a major in nuclear and atomic physics. In April 1981 he became a research scientist in the group of Professor Ivan Ivanov in the Faculty of Chemistry (currently Faculty of Chemistry and Pharmacy) in the same university, where he received his PhD in 1985 and was later promoted as Associate Professor in 1991 and Full Professor in Condensed Matter Physics in 2002. Along his academic career he was visiting professor in the group of Prof. Darsh Wasan in the Illinois Institute of Technology (Chicago, USA, 1987), in the Nagayama Protein Array Project (Tsukuba, Japan, 1992), and in the Laboratory of Ultrastructure Research, NIPS, led by Prof. Kuniaki Nagayama (Okazaki, Japan, 1999).

For many years Peter led the Laboratory of Thermodynamics and Physicochemical Hydrodynamics (1993–1999), the Laboratory of Chemical Physics and Engineering (2000–2008), and the Laboratory of Complex Fluids (2017–2020) in Sofia University. He was also a Dean of the Faculty of Chemistry and Pharmacy at Sofia University (2015–2019) and will be remembered for his constructive and efficient efforts to organize and coordinate the activities of these academic units. He created and lectured for many years several new University courses, and was supervisor of 16 graduated PhD students and dozens of BSc and MSc Theses. He led >50 research projects funded by the National Science Fund of Bulgaria and by large multinational companies, incl. Unilever, Lonza, KLK Oleo, Colgate-Palmolive and KAO. Peter was also Chair of the European COST Action D43 "Colloid and Interface Chemistry for Nanotechnology" (2008–2011) and Vice Chair of COST Action CM1101 "Colloidal Aspects of Nanoscience for Innovative Processes and Materials" (2012–2016).

His real passion, however, was the scientific research. Gifted with a physical intuition and strong mathematical background, Peter developed multiple theoretical models which are currently used and will be used by the future generations of colloid scientists. The main scientific contributions of Peter are in the fields of capillarity and surface forces; thermodynamics and hydrodynamics of thin liquid films and three-phase contact lines; physical chemistry of surfactants: thermodynamics and kinetics of adsorption, micellization and micelle growth, solubilization and rheology of surfactant solutions; attachment and interactions between particles at interfaces; interactions in colloidal and biocolloidal dispersions. One could emphasize here his theory of the lateral capillary interactions between particles attached to interfaces and immersed in thin liquid films used to provide theoretical explanation of the particle self-assembly in thin liquid layers, the theory of the oscillatory structural forces due to particles confined in liquid films, the new transversal line tension in thin films (introduced in his PhD Thesis), the theoretical models of micelle growth at high electrolyte concentrations and in mixed surfactant solutions, and many others.

One should particularly emphasize the pioneering studies of Peter Kralchevsky on solid (nano)particles attached to fluid interfaces and/or trapped in liquid films. He co-authored the first monograph in this area "Particles at Fluids Interfaces and Membranes" (Elsevier, Amsterdam, 2001, together with Prof. Kuniaki Nagayama). The original studies of Prof. Kralchevsky and this book gave him the status of one of the co-founders of this new field in colloid science which comprises nowadays multiple branches, including the design of new types of nanomaterials, the stabilization of foams and emulsions without surfactants, and the design of complex structured materials with applications in medical and optical devices, and in other technological areas.

Many of these remarkable achievements were summarized in his latest Lyklema plenary lecture at the ECIS on-line Conference in September 2020. His presentation titled "Capillarity and Self-Assembly" synthesized in a perfect way way his most important accomplishments to the development of this rapidly advancing field of colloid science.

His diverse scientific and teaching activities had brought him distinction at national and international levels. He was recipient of: "Prof. A. Zlatarov Prize" of the Bulgarian Academy of Sciences and the Sofia University (1990); "Blue Ribbon Medal" for significant achievements in science by the University of Sofia (2006); the Annual award "Best Professor" (2007), and the highest National Award "Pythagoras" for scientific achievements (2016) of the Bulgarian Ministry of Education and Science. In 2020 Peter Kralchevsky was elected as a member of Academia Europaea and was awarded the first "ECIS-Lyklema Prize", granted to a scientist with proven scientific excellence, who devoted in addition

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sustained and exceptional efforts to ECIS organizational activities and colloid community development.

The untimely death of Peter Kralchevsky is a tremendous loss for the international colloid and interface community and for the Bulgarian science. The legacy of his scientific contributions and hid devotion to develop our community will be remembered and will be continued by his colleagues and students.

Declaration of Competing Interest

The authors of this submission declare no conflict of interest.

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