OBITUARY

Professor Yuriy Reznikov (1953–2016)

Tatiana Nadeina\textsuperscript{a}, Yuriy Garbovskiy \textsuperscript{b} and Anatoliy Glushchenko\textsuperscript{b}

\textsuperscript{a}Institute of Applied Optics of the National Academy of Sciences of Ukraine, Kyiv, Ukraine; \textsuperscript{b}Department of Physics and Energy Science, University of Colorado Colorado Springs, Colorado Springs, CO, USA

Professor Yuriy Reznikov, the world renowned liquid crystal expert, suddenly passed away on 8 October 2016. The liquid crystal community lost its distinguished member, colleague, mentor and friend.

Yuriy Reznikov (16 October 1953 to 8 October 2016) was born in Kyiv, Ukraine. He was raised and educated in a family of passionate scientists. His parents and grandparents were highly regarded scientists working in different research fields (physics, history and archaeology; see the Appendix for more details).

The scientific atmosphere of his family and Yuriy’s natural curiosity resulted in his decision to become a physicist. He graduated from the Department of Radiophysics at Kyiv State University in 1976 and received his PhD in Physics from the Institute of Physics, Kyiv, Ukraine, in 1985. His thesis entitled, ‘The study of the optical nonlinearity of liquid crystals near their electron absorption bands’ was focused on a giant optical non-linearity observed in liquid crystals due to photo-transformations of their molecules. Readers are strongly encouraged to explore milestone papers \cite{1,2} for more details. He introduced the concept of conformational optical non-linearity of liquid crystals that stimulated active research around the globe. This outstanding work is an example of excellence in the science of liquid crystals for generations of PhD students at the Institute of Physics and around the world.

Since that time, Yuriy remained affiliated with the Institute of Physics of the National Academy of Sciences of Ukraine. In 1994, Yuriy completed his habilitation (the Doctor of Science degree) by defending a thesis entitled, ‘Light induced impurities in liquid crystals’. In 1995, he was elected chair of the department of physics of crystals. He served in this capacity until his unexpected death in 2016.

During his tenure at the Institute of Physics, Yuriy Reznikov was actively engaged in research on practically all aspects of liquid crystal science. He established a world-class research group and obtained many outstanding results. Given the limits of this obituary, it is impossible to highlight all of them \cite{3}.

In the late 1980s, Yuriy developed a new method to measure the anchoring energy of liquid crystals by means of light scattering. He also studied the combined effects of light and molecular photo-transformations on a pitch of cholesteric liquid crystals.

CONTACT Anatoliy Glushchenko aglushch@uccs.edu

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In the early 1990s, Yuriy made a major contribution to the concept of photoalignment of liquid crystals (for additional information, see paper [4]) and became a pioneer in this field. Interactions of liquid crystals with surfaces of different origin remained a research interest of Yuriy’s for the remainder of his life. His contribution to the field spans a variety of fundamental research topics, including surface bistability of liquid crystals on a photoalignment surface and surface-mediated photo-refraction of liquid crystals. It also included the applied science topics of design of flexible bistable plastic liquid crystal displays.

The penetration of nanotechnology in liquid crystal science in the late 1990s was significantly accelerated, thanks to the efforts of Yuriy Reznikov and his research team. He and his colleagues achieved excellent results in the preparation, characterisation and applications of liquid crystals doped with magnetic nanoparticles. To overcome some limitations imposed on magnetic liquid crystal nanocolloids by aggregation and the need to use a strong magnetic field, Yuriy proposed a concept of ferroelectric nanoparticle/liquid crystal colloids in his milestone paper [5]. This publication initiated extremely active international research leading to significant experimental and theoretical results (more information can be found in the last review written by Yuriy Reznikov [6]). At the same time, he was also interested in general properties of liquid crystals doped with nanoparticles of different origin. He obtained impressive results. They include the control of nanoparticles by means of topological defects and light; strong thermal optical non-linearity of liquid crystals doped with metal nanoparticles; strong orientational coupling in two-component suspensions of rod-like nanoparticles; the observation of high magnetic sensitivity of aggregated ferromagnetic nanocolloids; and the preparation of stable liquid crystal ferromagnetic nanocolloids and true colloids of semiconductor nanoparticles in liquid crystals. All these results made Yuriy Reznikov a pioneer of liquid crystal nanoscience.

Yuriy Reznikov always highlighted the need to develop new liquid crystal materials. In addition to liquid crystal nanocolloids, he designed and studied so-called filled nematic liquid crystals and stressed liquid crystals. He was also interested in exotic liquid crystals and methods of their characterisation. For example, he and his team devised an elegant method to measure an ultra-large cholesteric pitch.

As a true leader in the scientific community, Yuriy was an active member of several professional societies such as the Ukrainian Physical Society, International Liquid Crystal Society, Society of Informational Displays (SID), International Society for Optical Engineering (SPIE), and Ukrainian Scientific Club. He was a member of Advisory committees of 10 international conferences. He served on the Editorial board of *Liquid Crystals Today* and *Optics Express*. Yuriy published nearly 200 papers in scientific journals, held more than 15 US patents, and delivered many invited lectures at international conferences.

Yuriy Reznikov received many distinctions, honours and awards. In 2010, in recognition of his strong impact on the liquid crystals science, the Russian Liquid Crystal Society ‘Commonwealth’ awarded Yuriy Reznikov with the Freederickszs Medal. In 2012, for his seminal contribution to the development of the photoalignment of liquid crystals, Yuriy Reznikov received an award named after Antonina Prikhotko from the National Academy of Sciences of Ukraine.

Yuriy Reznikov was a person of high calibre with numerous interests, yet very humble and approachable. He enjoyed sports, especially badminton and tennis, and he liked to travel.

Yuriy considered a research team he nurtured and led at the Institute of Physics as his major achievement. Indeed, he managed to create and grow a Ukrainian liquid crystal school in the harshest time when the former Soviet Union collapsed and the economic system of modern Ukraine was not yet established. During that tumultuous time, the government often did not pay salaries to scientists, research labs were without heat during the winter, and there was no support for equipment and supplies. Yuriy, having natural management and leadership skills, secured international monetary support, attracted talented students, and managed to keep most of them employed at the Institute of Physics.

We, his friends, colleagues, and students, will always remember Yuriy Reznikov as a great man and a true scientific giant. He made the world better and inspired many to do the same.

**Disclosure statement**

No potential conflict of interest was reported by the authors.

**ORCID**

Yuriy Garbovskiy  [http://orcid.org/0000-0003-3047-8761](http://orcid.org/0000-0003-3047-8761)

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Appendix

Grandparents

Yuriy spent his childhood with his grandparents who provided the greatest philosophical and intellectual impacts. Alexander Leipunsky and Antonina Prikhotko, Yuriy’s grandparents, were students of Abram Ioffe (a father of Soviet Physics) in Leningrad Polytechnic Institute. Alexander Leipunsky, a well-known scientist in the field of nuclear physics, was director of the largest physics organisation of the USSR – Ukrainian Physics and Technology Institute (UPTI) in Kharkiv; Institute of Physics in Kyiv; Institute of Physics and Power Engineering in Obninsk. For his outstanding research achievements, Leipunsky was elected as a Full Member (Academician) of the Ukrainian Academy of Sciences, the highest honour given to a scientist in the former Soviet Union. Leipunsky was a member of the group of physicists who managed to split the atomic nucleus for the first time in the USSR. This team was the second group in the world to successfully perform this landmark experiment. Yuriy’s grandfather devised and implemented the concept of the reactor using fast neutrons and heat exchange circuits with liquid metals. He was scientific director of the nuclear power reactors developed for the Navy and spacecraft. During childhood and youth, Yuriy spent many holidays with his grandfather in Obninsk. Yuriy recalled the casual yet scientifically rigorous conversations with his grandfather.

Both a brother of Alexander Leipunsky, Ovsei Leipunsky, and sister, Dora Leipunska, were Soviet nuclear physicists. All three made major contributions to the USSR atomic project. Their names were classified for decades, but all were officially recognised for their successful test of the Soviet atomic bomb in 1949. Professor Ovsei Leipunsky (Institute of Chemical Physics) is the founder of the method of diamond synthesis and was instrumental in the methodological basis for radiometry and dosimetry of penetrating radiation. Together with Prof Zeldovich, Ovsei Leipunsky authored the theory of internal ballistics rocket propellant missiles ‘Katyusha’. He is the developer of modern solid fuels for missiles. Professor Dora Leipunska led a classified government laboratory, NII-9, where she worked on plutonium technology and dosimeters. Later she worked in the Nuclear Research Institute of Geochemistry and Geophysics. She developed a quantitative method of neutron activation analysis for mineral exploration.

Yuriy’s grandmother and his best friend, Antonina Prikhotko, was the first women who received a habilitation (Doctor of science) in physics and mathematics in the Soviet Union in 1943. She is one of the leading experts in the field of non-metallic crystals physics, a founder of physics of cryo-crystals, professor and also an Academician of the National Academy of Sciences of Ukraine. For many years, she was the Director of the Institute of Physics, National Academy of Sciences of Ukraine. She also was a chair of the Department of Physics of Crystals. The discovery of a specific crystalline state of matter called collective excitations (excitons) made independently of others by A. Prikhotko and A. Davydov is among the most important achievements of the solid-state spectroscopy, which affected the development of solid-state physics. The concept of excitons is now widely used not only in physics but also in chemistry and biology.

Parents

Yuriy’s father, Alexander Reznikov, graduated from the history department of the Kyiv State University and received a PhD in historical sciences. A. Reznikov could speak four western and two eastern languages and made a significant contribution to several important fields. They include studies of the Chartist movement in England, the period of ‘guided democracy’ in Indonesia; research on the Communist Parties of Asian Affairs (India, Indonesia and the Philippines); the study of strategy and tactics of international communism; the history and theory of the international labour movement; and the history of the Islamic revolution in Iran. He predicted dramatic events on 30 September 1965 in Indonesia. He lived and worked in Moscow, then in Obninsk. Alexander died at the age of 49 due to health problems.

Yuriy’s mother, Nina Leipunska, had a PhD in historical science. She worked as a senior scientist at the Institute of
Archaeology of the National Academy of Sciences of Ukraine. Her husband from the second marriage, and Yuriy’s stepfather, Professor Sergey Kryzhitsky, was a distinguished archaeologist. He was elected to the National Academy of Sciences of Ukraine in recognition of his distinguished and continuing achievements in original research. S. Kryzhitsky was also a department chair at the Institute of Archaeology of the National Academy of Sciences of Ukraine. For decades, he supervised the Olbia archaeological expeditions of the Institute, which usually involved more than 100 people. He is an author of several books about ancient Greek settlements in Olbia (south of Ukraine, on the bank of the Black Sea, near Mikolayiv). Yuriy’s parents spent every summer working at archaeological expeditions. During his childhood, Yuriy and his closest friends participated in the summer exploration of Olbia.

Family

Yuriy’s son, Dmitry (Mitya) Reznikov, a physicist, received his Master of Science degree from the Physics Department of Kyiv State University and his PhD from Kent State University. Currently, he works in the United States for Google Inc.

Yuriy is survived by his sister, Tatiana Kryzhitska, of Kyiv, and Victoria Reznikova, of Germany. Yuriy’s first wife, Svetlana Reznikova, is a researcher at the Institute of Modelling Problems in the Energy Sector of the National Academy of Sciences of Ukraine. His wife from the second marriage, Tatiana Nadeina, is a patent engineer at the Institute of Applied Optics of the National Academy of Sciences of Ukraine.