In Memory of Professor Robert R. Gałązka (1937–2021)

Robert R. Gałązka born July 14, 1937, passed away on April 14, 2021. He was a Professor of Physics, a member of the Polish Academy of Sciences, a Director (1999–2003) of the Institute of Physics in Warsaw and Chairman of its Research Council (1990–1999).

After completing his studies in physics at the University of Warsaw in 1960, Robert R. Gałązka started his spectacular 60 year long scientific career in the Institute of Physics, Polish Academy of Sciences, in 1961. He obtained his PhD degree in physics in 1966, the Habilitation degree in 1972, and the title of Professor in 1980. From 1990 he served as a member of the Editorial Committee of *Acta Physica Polonica A*.

The scientific activity of Professor Gałązka centered on semiconductor physics. This field developed rapidly in the 1960s and 70s, when the Polish semiconductor community was led by Professor Leonard Sosnowski, Gałązka's scientific mentor. R.R. Gałązka gained international reputation as one of the prominent members of the Warsaw school of semiconductor physics. In 1988 he chaired the most prestigious biannual meeting of the world semiconductor physics community — the International Conference on Physics of Semiconductors (ICPS1988) — which was held in Warsaw.

In recognition of his scientific and organisational achievements, Professor R.R. Gałązka received several top Polish scientific awards: the Maria Skłodowska-Curie Award of the Polish Academy of Sciences — in 1987, the Marian Smoluchowski Medal of the Polish Physical Society — in 2007, and the Award of the Prime Minister of the Republic of Poland — in 1996. In 2013, he was decorated with the Officer's Cross of the Order of Polonia Restituta by the President of the Republic of Poland.

Professor Gałązka contributed extensively to the development of semiconductor physics by studying the electronic structure of novel II–VI semiconductor materials, i.e., zero-gap HgSe and HgTe, and the (Hg,Cd)Te semiconductor alloy, an important infrared opto-electronic material with a composition-controlled energy gap and a Dirac-like electron energy spectrum.

His greatest scientific contribution is related to the discovery of semimagnetic semiconductors — a new class of both semiconductor and magnetic materials "in one", in the form of substitutional alloys with transition metal ions. The exchange coupling between spins of band electrons and magnetic ions dramatically modifies the electronic structure of these semiconductors. As a result of this discovery, several spectacular magneto-transport and magneto-optical effects, as well as carrier-induced ferromagnetism, have been observed.

Throughout his entire fruitful career, Professor Gałązka strongly promoted the technology of semiconducting materials at the Institute of Physics research laboratories, and also explored the field of materials science in space (growth of the (Hg,Cd)Te alloy under zero-gravity conditions) which resulted in his long engagement with international space agencies.

His publication record includes over 200 papers cited together more than 4,000 times, with nine works cited over 100 times.

Professor Gałązka always preferred simple and scientifically sound ideas, formulated in a clear way, permitting experimental verification. He brought to light new theoretical problems to be solved. Being equally proficient in growing his own semiconductor crystals, taking quantum magneto-transport or magnetic measurements of novel materials, and discussing new physical concepts, he supplied several seminal ideas that for decades influenced the scientific life of many semiconductor physicists alike in Poland and abroad.

Professor Gałązka for many years headed the Division of Semiconductor Physics of the Institute of Physics, Polish Academy of Sciences and supervised the PhD theses of 15 researchers, six of whom have already been nominated Professors of Physics. He was always ready to share his knowledge and experience with his younger colleagues as well as to discuss new ideas with numerous Polish and international friends.

Being an active scientist for 60 years, Robert Gałązka had the rare privilege to witness the re-birth of zero-gap and inverted-narrow-gap semiconductors as new quantum materials, studied by him in the 1970s. Today they are known as topological insulators or semimetals. He was also privileged to monitor a truly world-wide rise of research on semimagnetic semiconductors in the 1990s, boosted by the discovery of new III–V ferromagnetic semiconductors with manganese. In fact, this research concept was deeply rooted in the original works on II–VI and IV–VI semimagnetic semiconductor materials studied by R.R. Gałązka and his collaborators.

The talent to choose the right research subject, to grow his own materials when needed, and select the right people to work with, was his key to success in science. Although Professor R.R. Gałązka is sadly no longer with us, his stunning scientific career will continue to be an example to follow.

Tomasz Story