Z KART HISTORII/FROM THE PAGES OF HISTORY

ESTABLISHMENT AND DEVELOPMENT OF CHEMISTRY AND CHEMICAL TECHNOLOGIES IN THE LVIV POLYTECHNIC UNIVERSITY (PART 2)

This article is a continuation of the work [1] about the establishment and evolution of chemical and chemical-technological education and science at the Lviv Polytechnic National University during the reign of Austria-Hungary and Poland (1816-1939). The purpose of this work is to highlight the further development of educational and scientific processes in the chemical divisions of the institution and the characteristics of the activities of professors and teaching staff during the period from the beginning of World War II to the present day. The specified period, unlike the previous one, is not sufficiently covered in publications and requires a deeper study. The given information is incomplete, sometimes it is subjective and contradictory, due to its publication under the influence of ideological and other factors.

The history of Polytechnic's chemists and chemical divisions during the Second World War is described in works [2–6], the Soviet period is partially covered in works [6-16], and the period of the independent Ukrainian State is described in [7–15].

ANALYSIS OF INFORMATION SOURCES

Before the Second World War, the Lviv Polytechnic University was the leading higher technical educational institution in Poland, where qualified engineers were trained at a high level, and many scientific, research, and design works were carried out. Professors and associated professors were active in social and political life, and participated in the development of statehood and economy. But the development of Lviv Polytechnic was interrupted by the war, resulting in a significant loss of personnel potential, repressions, and the material base of destruction. On September 1, 1939, German air force made the first bomb attack on Lviv. On September 12, 1939, German artillery shelled the city and several units tried to enter it. Soon the situation had changed. According to the Ribbentrop-Molotov Pact, the Red Army occupied the western part of Ukraine and entered Lviv on September 22. The first Soviet period in the history of Galicia began, which is popularly called the "first Soviets".

With the new government in power, all national and cultural organizations were liquidated, political parties had been forced to disband, and journals had to cease publications. At the same time, all directors of government institutions were ordered to resume work. Lviv Polytechnic also started working. A record number of 2,058 students were enrolled for the new academic year [3]. The institution was renamed the Lviv Polytechnic Institute (LPI) with the appointment of a commissar and the organization of a party committee, a trade union committee, and a Komsomol committee. The new administration closed some departments and opened a new one – the Department of Marxism-Leninism. Further teaching was conducted mainly in Polish, some subjects were taught in Ukrainian (in particular, Dr. Yu. Hirnyak taught physical and colloidal chemistry in Ukrainian), and Marxism-Leninism was taught in Russian. Five-year study programs were introduced, as it was in Soviet universities. In the summer of 1940, a postgraduate course was opened.

At the Faculty of Chemistry, the activity of the former departments was resumed with a changed staff. Professor M. Kamieński remained the dean and the departments were headed by previous leaders [16]. Professor A. Dorabialska worked for a short time and already in 1940 went to Warsaw. Thus, the Department of Physical Chemistry was headed on a part-time basis (the same as in 1932-1934) by W. Jakób, who remained also the Department of Inorganic and Analytical Chemistry of the head.

A new all-institute Department of Chemistry was created to teach this discipline at other faculties. Professor E. Płażek and associate professors with doctoral degrees D. Längauer and F. Markhlevska-Shraerova worked here. D. Längauer, whose wife was Ukrainian and who knew Ukrainian and Russian, was appointed the head of the Department. The salt industry laboratory was attached to this department. The Departments of Physics II (from the Faculty of Chemistry) and Physics III (from the Faculty of Agriculture and Forestry) were united into one department under the leadership of professor T. Malarski. Professor Z. Klemensiewicz started to work there, Dr. Ya. Nikliborc was appointed to the position of associated professor, and Dr. Z. Sokalski – to the position of assistant professor. Many pre-war teachers with doctoral degrees also became assistant professors: M. Turkevych, F. Nowotny, H. Kuczyński, W. Wawryk, and others. Graduates of the Polytechnic served as assistants.

The first Soviet period ended quickly. Before retreating from Lviv, the Soviet punitive bodies exterminated

thousands of prisoners, most of whom were intellectuals, priests, entrepreneurs, and students. Many people have gone missing.

On June 30, 1941, German troops entered Lviv. Arrests and repressions began. On the night of July 3–4, 36 Lviv scientists and members of their families were shot on the Vuletsk hills, among them was professor S. Pilat. All Lviv universities were closed. A military hospital was again placed in the main building of the Polytechnic.

In the spring of 1942, in the face of a qualified personnel acute shortage of in the occupied territories, the German government was forced to organize state professional courses in various specialties in Lviv. Technical professional courses in 11 areas were opened at Lviv Polytechnic, the industrial chemistry was among them [4]. The language of teaching was German, although some subjects were taught in Polish and Ukrainian. The former staff of the Polytechnic, including chemistry professors, were employed in the educational process. In parallel with the main courses, some of the professors (E. Sucharda, T. Kuczyński, M. Kamieński), in agreement with the Polish government in exile of the underground structures, carried out secret training of Polish students according to pre-war programs. The majority of departments and professors were formally retained at the Faculty of Chemistry. After the death of Prof. Pilat, the Department of Petroleum and Natural Gas Technology was headed by associate professor M. Turkevych. During the difficult years of the occupation, scientific research was practically not conducted, but some of the professors used their chemical knowledge in the struggle for survival. For example, professor Sucharda organized the production of artificial honey, jams, soap, and "bimber" (moonshine), as well as explosive materials and other chemical substances for the Armia Krajowa (AK).

In the spring of 1944, the Germans began to leave Lviv, taking anything valuable from the Polytechnic – machines, devices, and various equipment. In the chemical building, copper wires were torn from the walls, and lead sewage was partially dismantled [4].

With the new arrival of the Red Army in August 1944, the LPI resumed its activities with a changed structure. Departments of the Chemical Faculty were part of two faculties: the Faculty of Chemistry and Technology (former Chemical Faculty) and the Petroleum Faculty. The structure of the Faculty of Chemistry and Technology (FCT) was as follows [16]:

– **Department of Organic Substances Technology**, headed by professor W. Leśniański;

– **Department of Inorganic Substances Technology,** headed by associate professor A. Zhyvotovskyi

– **Department of Inorganic and Analytical Chemistry**, headed by associate professor D. Längauer;

– **Department of Organic Chemistry**, headed by professor E. Sucharda;

– **Department of Physical and Colloidal Chemistry**, headed by associate professor Z. Sokalski;

– **Department of Food Products**, headed by associate professor P. Galabudskyi;

– **Department of Fermentation Products Technology**, headed by associate professor O. Cherniavskyi.

In addition, the work of the all-institute **Chemistry Department** was resumed, the head of which was associate professor Borys Nekleevich.

Fig.1. D. Längauer

Donat Längauer (1905–1945) (Fig. 1) was appointed the first dean of the FCT [1]. He was born in Bashkiria. In 1922, the Längauer family moved to Lviv. In 1928, he graduated from Lviv Polytechnic with a degree in chemical engineering. First, he worked as a chemist (1928–1929) at the potash factory in Kalush, then as an assistant (1929–1933) and teacher (1933-1940) at the Department of Chemical Technology I and Technical Electrochemistry of the Lviv Polytechnic. In 1931, he received the scientific degree of Doctor in Technical Sciences. In 1940, he was appointed the head of the Chemistry Department, and from 1944 to 1945 he worked as the dean of the FCT. He was baselessly accused of cooperation with the NKVD by underground members of the AK, who first killed his 11-year-old son, and soon killed himself at his son's grave [15]. After that, B. Nekleevych became the dean of FCT.

The Petroleum Faculty had eight departments, including the **Department of Petroleum and Natural Gas Technology** under the leadership of associate professor Eva Neuman-Pilat (wife of the late professor Pilat) and the **Department of Mineralogy and Geology** headed by professor M. Kamieński, who was appointed the Petroleum Faculty of the dean.

The activity of Lviv Polytechnic was not long: at the end of 1944 and the beginning of 1945 repressions began. A group of Polish professors and assistants were arrested, and some of them were sentenced to various terms of imprisonment in concentration camps. Among them were chemistry professors: T. Kuczyński, E. Sucharda, and E. Płażek. After six months, the prisoners began to be released, and allowed to leave for liberated Poland. Unfortunately, T. Kuczyński, who was exhausted by hard labor and malnutrition, did not take advantage of this and died in the hospital [3].

In 1945–1946, most of the Polish nationality staff, who worked at LPI and other universities, left for Poland in organized groups, restoring the former and creating new higher education institutions there. It was the end of the Polish period in the history of the Lviv Polytechnic.

Only 5 professors remained at LPI, and no chemists were among them [4]. But some of the former employees of various nationalities who studied and worked at the pre-war Polytechnic remained in the associate professors and assistants of positions. They passed on to the next generations the educational, scientific, and methodical assets, which became a solid basis for the restoration and

further development of chemical education and science in the post-war years. Among them were K. Mykhalevych and D. Tolopko, who later became professors and headed the departments.

After the departure of most professors to Poland, the teaching staff began to be formed from representatives of various universities of the USSR and demobilized military personnel who had higher education. They mostly spoke and taught in Russian, and had a different mentality. Local personnel were treated with distrust and were usually not allowed to lead departments or faculties. As a result, the newly formed collectives were not united by common scientific topics, uniform methodological approaches to student education, etc. The administration of LPI often changed the structure of faculties, deans, and departments of heads. At that time, the state financing of education was scarce, and the laboratory and technical base of the department was created practically from scratch. There was a lack of reagents and chemicals, as well as textbooks and other methodical support. However, despite these and other difficulties, the educational and scientific activity of polytechnic chemists was resumed.

Fig. 2. Y. Berkman

In 1945 the Department of Inorganic and Analytical Chemistry was divided into two ones: "**General and Inorganic Chemistry**", to which the all-institute Chemistry Department was attached, and "**Analytical Chemistry**". The first of them was headed by professor Yakiv Berkman (1897–1967) (Fig. 2) – a reputable scientist and teacher, a specialist in the synthesis of tannins and leather dyes, and a Stalin Prize of the laureate. The second department was headed by professor Anatoly Zanko, then associate professor Oleksandr Zanko (son of A. Zanko), and later by associate professor Lidia Panteleeva.

Fig. 3. T. Yurzhenko

Since 1946 the Department of Organic Chemistry was headed by associate professor (later a professor) Tymofiy Yurzhenko (1905–1973) (Fig. 3). He was a researcher in the area of organic chemistry and studied the synthesis and application of organic peroxide compounds. He organized a laboratory for the synthesis of new materials, where a new class of compounds was obtained – unsaturated peroxides capable of polymerization and copolymerization (peroxide monomers) used for the synthetic rubbers of synthesis [9]. Associate professor Andrii Zhyvotovskyi remained the Department of Inorganic Substances Technology of the head until 1960, although the name of the department was changed. After professor Leśniański, the Department of Organic Substances Technology was headed by associate professor Yona Grinberg, who in 1952 was replaced by associate professor Borys Boldyrev. In the same year, the department was renamed the "**Department of Organic Synthesis Technology**". Associate professor Yevgenia Vasenko was appointed the Department of Physical and Colloid Chemistry of the head.

In 1945 a Food Faculty was organized, which included the following departments [16]:

– **Department of Sugary Substances Technology**, headed by associate professor P. Galabudskyi;

– **Department of Fermentation Substances Technology**, headed by associate professor O. Chernyavskyi;

– **Department of Microbiology**, headed by associate professor S. Bukhkalo.

O. Chernyavskyi was appointed the dean but the new faculty did not last long. Till 1949 only two graduations of specialists in "Sugar production" were carried out, the Food Faculty was closed, and the Department of Fermentation Substances Technology joined the FCT.

Department of Oil and Natural Gas Technology in 1945 was headed by the associate professor (later a professor) Serhii Popov. He studied the composition of oil and ozokerite of Boryslav, and wrote the textbook "Chemistry of Oil and Gas". In 1951 the Petroleum Faculty was divided into three faculties: mining and industrial, geological and prospecting, and petroleum. The Department of Organic Chemistry and the Department of Oil and Gas Processing was transferred to the Petroleum Faculty under the leadership of professor Borys Hrynenko, a specialist in of natural gas oxidative pyrolysis, extraction purification of oil, and hydrocarbon mixtures of separation. Later, the Petroleum Faculty was transferred to the city of Ivano-Frankivsk, and the above-mentioned departments were included in the FCT.

After the war, industrial and civil construction took place in the country at a rapid pace. For providing the industrial sector with staff the **Faculty of Cement Technology** was formed at LPI in 1949. The faculty included the following departments: "**Cement and Glass Technology**" (headed by associate professor Kateryna Klymanova), "**Technology of Ceramics and Refractories**" (headed by associate professor Kateryna Galabudska), and "**Machines and Devices of Silicate Production Plants**" (headed by associate professor Dmytro Savkevych). In 1953, the Faculty of Cement Technology was renamed to the **Faculty of Silicate Technology** with the same departments; in 1955 it was closed and two departments were created on its basis: "**Silicate Technologies**" (headed by associate professor Vasyl Tikhonov) and "**Mechanical Equipment of Silicate Plants**" (headed by associate professor Petro Skrypkin), which soon became part of the FCT.

The need to provide the chemical and other branches of industry with specialists in control, measuring and regulating devices led to the opening of a new department in 1956. This new **Department of Monitoring**

Fig. 4. Basic Research Building (modern view)

Fig. 5. Dormitory No. 3 for the students of FCT (modern view)

Fig. 6. Dormitory No. 4 for the students of FOST (modern view)

and Control Instruments of Chemical Production was headed by associate professor Yuriy Sitnytskyi. At the end of the 1959/1960 academic year three departments were closed: "Technology of Fermentation Production", "Technology of Inorganic Substances" and "Processes, Machines, and Devices of the Chemical Industry". On their basis, the department "Technology of Inorganic Substances, Chemical Fertilizers, Processes and Devices of Chemical Production" headed by O. Chernyavskyi was created.

In the late 1950s, on the initiative of USSR leader Nikita Khrushchev, the chemicalization of the national economy began. Therefore, the funding of chemical educational institutions was radically increased, the list of specialties in the chemical profile was expanded, and the requirements for dissertation defense were eased. At FCT the enrollment of students was opened for the specialty of the organic profile, in particular, related to the rubber and synthesis, and plastics, and technology and processing. In this regard, the Department of Organic Chemistry and Technology of Organic Synthesis was first divided into two, and then into four separate ones:

– **Department of Organic Chemistry**, headed by professor T. Yurzhenko;

– **Department of Technology of Biologically Active Compounds, Semi-Products and Dyes**, headed by associate professor Boldyrev;

– **Department of Technologies of Basic Organic and Petrochemical Synthesis**, headed by associate professor D. Tolopko;

– **Department of Chemical Technology and Processing of Plastic Masses and Synthetic Rubber**, headed by associate professor V. Yavorovska.

During the 1930s, the construction of a technological building [3] was planned for the Faculty of Chemistry, but its implementation was prevented by the war. It was built only in 1963. Now it is academic building No. 8 (Fig. 4). In 1967 the **Faculty of Organic Substances Technology** (FOST) was separated from FCT. The existing 10 departments were divided equally between both faculties. Professor Yurzhenko became the first dean of FOST.

The number of students at FCT and FOST increased significantly. To provide them with housing, two dormitories were built: No. 3 (Fig. 5) with 480 places for students of FCT, and No. 4 (Fig. 6) with 505 places for students of FOST.

The changes also affected the leadership of the departments. Professor Dmytro Tolopko (1912–1990) (Fig. 7) became the head of the Department of Basic Organic and Petrochemical Synthesis Technology, professor Regina Wizgert (1919–2002) headed the Department of General and Inorganic Chemistry, professor Serhii Chuchmaryov (1921–2010) – the Department of Physical and Colloidal Chemistry, professor Hryhoriy Akselrud (1919–2003) (Fig. 8) – the Department of Technology of Inorganic Substances, Chemical Fertilizers, Processes and Apparatuses of Chemical Production, associate professor Kyrylo Mykhalevych (1905–1986) (Fig. 9) – the Department of Analytical Chemistry. It is worth noting that K. Mykhalevych began his scientific activity in 1929 at the

Fig. 7. D. Tolopko

Fig. 8. H. Akselrud

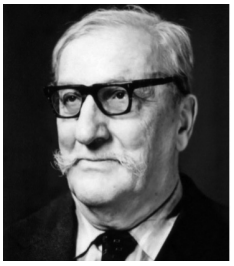

Fig. 9. K. Mikhalevich

Department of Inorganic Chemistry under the professor W. Jakób leadership, the Polish school of coordination chemistry founder. After the war, he continued his research on cyanide complexes of transition metals and defended his thesis on this topic. That is why he was included in the Lviv branch of this school.

In the 1960s and 1970s, the chemical industry, science, and education developed intensively. In the west of Ukraine, the Rozdil and Yavoriv sulfur plants, the Kalush and Stebnyk potash plants, the Rivne nitrogen-fat plant, a series of cement, ceramic, glass-making, alcohol, and other enterprises were built, which required a significant number of specialists. At the same time, the industry needed serious scientific and technological assistance from science. Scientific and research laboratories were organized at the departments, which carried out various studies on the orders of enterprises. Based on their results, many Ph.D. and doctoral theses were defended. Postgraduate courses were opened in all departments. Chemists of Polytechnic began not only to provide themselves with scientific personnel but also to help other organizations with young scientists. From 1970 to 1991, 26 doctoral theses and more than 200 Ph.D. theses were defended. In the 1980s, only doctors of science, and professors were the heads of departments.

In 1969 the Department of Technology of Inorganic Substances, Chemical Fertilizers, Processes and Apparatus of Chemical Production was divided into two departments: "**Processes and Apparatus of Chemical Production**" and "**General Chemical Technology**". The first of them was headed by professor Akselrud, and the head of the second one was associate professor (later a professor) Viktor Yavorskyi (1937–2016) (Fig. 10), who resumed the engineers training in the specialty "Technology of inorganic substances", and in 1991 – in the specialty "Technical electrochemistry", which was interrupted in 1939. Professor Yavorskyi headed the department for 47 years. Under his scientific guidance, 6 doctoral and 46 Ph.D. theses were defended. During 1971–1974 he was the dean of the FCT.

Fig. 10. V. Yavorskyi

In the 1970s and 1980s, the Department of Silicates under the professor Lyudmila Shpynova (1918–1989) leadership became an important department of the FCT, which had 60 employees and recruited students in three specialties (three groups of 25 people for each specialty): chemical technology (CT) of binders, CT of ceramics and refractories, CT of glass and sitals [14]. Several specialized laboratories equipped with advanced devices and apparatus for researching the structure and properties of silicate materials functioned at the department. Based on the results of the research, four monographs were published, devoted to the cement stone microstructure hardened under different conditions, the crystal chemistry of cement minerals, and the winter cement and concretes technology. Many developments were implemented in the enterprises of the region.

Scientists from the Academy of Sciences or branch institutes were often invited to be the heads of the departments: professor Oleksandr Soshko headed the Department of Chemical Technology and Processing of Plastic Masses; professor Borys Chernyak – the Department of General Chemistry; professor Vasyl Shevchuk – the Department of Analytical Chemistry, and later the Department of Chemical Technology of Oil and Gas Processing; professor, academician of the Academy of Sciences of the Ukrainian SSR Roman Kucher – the Department of Oil Technology and Petrochemical Synthesis.

In 1977 associate professor (later a professor) Yevhen Mokryi (1934–2001) (Fig. 11), a specialist in ultrasonic initiation and intensification of organic compounds oxidation processes was elected dean of FOST. Later, he became the head of the Department of Basic Organic and Petrochemical Synthesis Technology. A special feature of Y. Mokryi was his love for sports. During his sports career, he was a ten-time champion and record holder of all-Union student games.

Fig. 11. Y. Mokryi

In the 1990/1991 academic year the FCT and FOST included 11 departments and several scientific research laboratories. The number of students was 1,465. 777 were full-time students at the FCT, including 506 female students, and 99 were part-time students (specializing in chemical technology of inorganic substances). 589 students studied at FOST, including 338 female students. Most of the students received scholarships and were provided with a place in the dormitory.

In 1991 the Soviet period in the history of LPI chemists ended, during which fundamental changes took place in the structure of the faculty. The number of departments increased, their personnel potential increased quantitatively and qualitatively, the students number increased, and most of them were females. The material and technical base of the educational process was created, and a new educational and scientific building and two dormitories for the chemistry students were built. At the departments, the existing directions of research were constantly developed and new directions appeared. During the period of 1960s–1980s, scientific schools headed by famous scientists were formed, for instance:

– Professor T. Yurzhenko – multifunctional peroxide modifiers and polymer composite materials;

– Professor H. Akselrud – mass transfer processes with a solid phase;

– Professor V. Yavorskyi – chemistry and technology of Sulfur compounds;

– Professor V. Shevchuk – thermal and catalytic transformations of hydrocarbons and their derivatives.

The departments maintained close liaison with chemical enterprises of the region and the whole country and performed a significant amount of scientific research aimed at solving the industry of the problems.

At the same time, we also remember the negative aspects of that socialist reality, which were imposed on the lives and activities of polytechnic chemists and students. In particular, this is the restriction of democratic freedoms, the educational process of ideological loading, flouting the national values, increasing Russification, and party subjectivism in the management of the institute and faculties. All these factors, in the end, reduced the effectiveness of education and scientific work, worsened the psychological climate in departments and student groups, and hindered the formation of harmonious personalities. Graduates of the faculty were sent to work, first of all, in other republics of the Union, implementing the "peoples mixing" of policy. Many polytechnics are still working in the vast expanses of the former Soviet empire.

The collapse of the USSR and the independent Ukrainian State formation created the prerequisites for a radical restructuring of social life and the educational sphere in particular. A new Ukrainian period in the history of polytechnic chemists has begun. In 1993 the name of the university was returned to "Lviv Polytechnic". In 2001, the faculties of FCT and FOST were merged into the **Institute of Chemistry and Chemical Technologies** (ICCT), the director of which became professor Yosyp Yatchyshyn. At the same time, the post-Soviet economic complexes destruction, a sharp drop in industrial production, and the closure of powerful chemical factories in the region had a negative impact on the education and science development, as their state funding was significantly reduced. The number and scope of contracts with chemical enterprises decreased, narrowing the topics and research areas. A difficult period began, and it continues to this day.

Despite this, chemical and chemical-technological education and science at the Lviv Polytechnic continue to develop thanks to the high-qualified personnel formed in previous years. During the time of Ukraine's independence, the following departments were in the structure of ICCT:

– Department of General Chemistry, headed by M. Nykypanchuk (until 2004) and V. Starchevskyi (until 2018);

– Department of Organic Chemistry, headed by S. Voronov (until 2021), and V. Donchak (until today);

– Department of Analytical Chemistry, headed by Y. Yatchyshyn (until 2018);

– Department of Chemical Technology of Oil and Gas Processing, headed by M. Bratychak (until 2021), and O. Hrynyshyn (until today);

– Department of Technology of Biologically Active Compounds, Pharmacy, and Biotechnology, headed by V. Novikov (until 2020), and V. Lubenets (until today);

– Department of Chemical Technology of Plastics Processing, headed by O. Suberlyak (until 2021), V. Levytskyi (until today);

– Department of Chemistry and Technology of Inorganic Substances, headed by V. Yavorskyi (until 2016), Z. Znak (until today);

– Department of Chemical Technology of Silicates, headed by Y. Yashchyshyn (until 1998), M. Hyvliud (until 2006), Y. Vakhula (until today);

– Department of Technology of Organic Products, headed by E. Mokryi (until 2001), Z. Pikh (until 2022);

– Department of Chemical Engineering, headed by Ya. Humntskyi (until 2002), Ya. Khanyk (until 2010), V. Atamaniuk (until today);

– Department of Physical and Colloidal Chemistry, headed by Y. Wang-Chin-Hsian (until 2014), V. Sergeyev (until 2018).

In 2015 professor Volodymyr Skorokhoda, a specialist in matrix polymerization of vinyl monomers and synthesis of polymers for biomedical purposes was elected the institute director. In 2018, the **Department of Physical, Analytical and General Chemistry**, headed by professor Pavlo Shapoval, was created by merging the three departments.

Currently, the ICCT is one of the university's most powerful educational and scientific divisions, which includes 9 departments, 5 research laboratories, and the center for equipment collective use "Laboratory of promising technologies for the creation and physico-chemical analysis of new substances and functional materials". In 2020–2021, the confectionary corporation "Roshen" joined the modernization of the material, technical and scientific base of the institute, and invested substantial funds in the repairing and equipping of the institute's laboratories with modern equipment. The institute teaching staff consists of 145 highly qualified employees, including 38 D.Sc. and 104 Ph.D. The institute has 1,050 students in 5 specialties at all three levels of training, dozens of post-graduate and doctoral students. Students participate actively in scientific work, and many are participants in international projects, grants, and internships abroad.

Departments implement international, budgetary, and other agreements on the development of theoretical foundations and technologies of new organic and inorganic substances and materials for various purposes. The topics of the work are formed taking into account the domestic economy real needs (chemical, petrochemical, pharmaceutical, construction, and related sectors of the economy) and based on the contracts with domestic and foreign enterprises. The last 8 years of the Russian-Ukrainian war and three years of pandemics have become tough trials for the entire Ukrainian State life and the ICCT in particular. There have been significant changes in the educational process associated with a partial transition to online education, and new directions of research related to military topics have appeared in the departments. Thus, at the Department of Organic

Fig. 12. Chemical Building (modern view)

Chemistry, with the participation of students, hydrogel dressings for healing wounds and burns, and hemostatic bandages based on natural materials were developed and improved. Since the beginning of the war, scientists have handed over 40,000 hydrogel dressings to the front lines and hospitals. The Department of Chemistry and Technology of Inorganic Substances has developed a filter for water purification in field conditions, a hemostatic powder with antibacterial properties, hand smoke grenades, and a universal smoke grenade, which has been assigned a NATO code and adopted by the Armed Forces of Ukraine. The Department of Chemical Technology of Plastics Processing is developing new biodegradable polymers, and polymers for medicine and pharmacy (contact lenses, osteoplastic materials for replacing bone tissue, and polymer carriers for the controlled release of drugs).

In 2021, employees of the institute published 99 articles in scientific journals, received 59 patents, and defended 3 doctoral theses. Three specialized councils for the defense of doctoral theses in eight specialties successfully function at the institute. In the last 5 years alone, 18 doctoral theses and 66 candidate theses have been defended by the employees of the institute. The institute is publishing two periodical scientific journals: "Chemistry and Chemical Technology" (edited by M. Bratychak) and "Chemistry, the Technology of Substances and their Applications" (edited by V. Skorokhoda). The teaching staff and students of the institute are open to international cooperation, participate in international scientific forums, and conduct joint research. Dozens of agreements on scientific and technical cooperation, implementation of joint projects, and grants in the science, technology, and education fields have been concluded. The Institute of Chemistry annually organizes and holds international scientific conferences, congresses, and symposia.

Thus, the development of chemical education and science at the Lviv Polytechnic was not interrupted by the years of the First and Second World Wars, the change of state affiliation, or political and other factors, but continues to develop and improve. All the best does not disappear, it is transmitted from one generation to another, embodied in thousands of graduates, and implemented in scientific developments, monographs, textbooks, articles, etc. It seems that there is a special Spirit of Chemists in the chemical building (Fig. 12), which has been protecting the achievements of all generations for 150 years, contributing to the constant restoration and further development of chemical education and science at the Lviv Polytechnic.

CONCLUSIONS

150 years ago the Department of Chemical Technology and the School of Technical Chemistry were created at the Technical Academy of Lviv. It was the beginning of professional chemical-technological education and science in Galicia. Its high level, established by the first professors of the School was supported and developed by subsequent generations of professors and associate professors. Evidence of mentioned is the high qualification of thousands of engineers and scientists trained over a 150-year period as well as the world-famous scientific developments, monographs, textbooks and articles made by polytechnic chemists. The change in the structure of chemical sections in the Polytechnic as well as the creation and closure of departments, laboratories, and research groups, caused by changes in the economy and world science have been updated the educational and scientific processes, making it possible to provide personnel for newly created enterprises in chemical, petrochemical and other industries to improve existing production.

Polytechnic chemists took an active life position promoting the cultural, social, economic and political development of the region and the states in which they were located. They published magazines and newspapers,

organized scientific and technical societies, schools, participated in the design and modernization of enterprises also in technical issues solution of Lviv. Within 150 years, the glorious way from the department and school to the basic institute known outside of Ukraine has been covered. The achievements of all polytechnic chemists generations were not lost during wars, political and social changes but became a solid basis for the activities of current Institute of Chemistry and Chemical Technologies of the Lviv Polytechnic.

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