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CHRONICLE

In Commemoration of Kseniya Mikhailovna Gorbunova's Centenary (1904–1990)

This year we celebrate the centenary of a Russian scientist, Kseniya Mikhailovna Gorbunova (1904–1990, formerly doctor of chemistry, professor).

Gorbunova was born on August 16, 1904 in Kislovodsk. She had worked since 1920, first as an instructor on collecting plants for medicine and industry at the Central Pharmacological Factory of the Taganrog District. Since 1922 to 1927, she studied at the Leningrad Polytechnical Institute, after which she was taken as a probationer at the Electrometallurgy Department of the Institute of Metals. In 1930, she entered a post-graduate course under supervision of academician V.A. Kistyakovskii in his freshly organized Laboratory of Colloids and Electrochemistry and simultaneously became Head of the Electrocrystallization Group. This direction later became the main subject of her further scientific carrier. Her doctoral dissertation "Electrocrystallization of Metals" was already prepared by 1936. She defended her dissertation at a Scientific Council, opposed by Professor I. Stranski, Director of the Max Plank Institute (Berlin), the outstanding scientist of that time in the field of crystal growth theory.

As a doctor of chemistry, Gorbunova substantially extended the sphere of her scientific interests. Carrying on fundamental studies in the field of metal electrocrystallization, she also conducted research into complex physicochemical processes at the metal/solution and metal (semiconductor)/gas interfaces in order to reveal mechanisms of the new phase formation under these specific conditions. She quickly became the most prominent and recognized authority in the field of physicochemical processes of electrochemical nucleation and crystal growth. In cooperation with P.D. Dankov, she developed a crystallochemical theory of growth of individual crystals, whiskers, and dendrites and elaborated original methods for studying the crystal growth, including interferometry of multiple reflection from faces of growing crystals. In 1939, Gorbunova was appointed a professor.

Studying fundamental problems of electrocrystallization, Gorbunova always tried to relate electrochemical conditions of electrodeposition of metals and alloys to the morphology and physical properties of deposits—the aspects important for applied electroplating. As a rule fundamental laboratory studies were generated by new demands of industry. One example is the phenomenon of brightening upon introduction of 2-6, 2-7 disulfonenaphthalic acid to nickel-plating baths, which was discovered in the 1940s by Professor N.T. Kudryavtsev and could not have been explained in terms of electrochemical thermodynamics and kinetics. The electron microscopy and electron diffraction studies carried out by Gorbunova showed that the surface of the electrolytic deposits formed in the presence of brightening agents was covered by a phase film of nickel hydroxides. This allowed her to advance a hypothesis which explained the unusual and that far unknown morphology of electrodeposits grown in the presence of brightening agents, viz., the reduction of nickel hydroxides and its poorly soluble compounds. The crystals formed in the process lacked clear-cut faces, and the surface of the electrodeposits thus obtained looked smoothed-out even at high magnification, while seemingly crystalline according to the x-ray data. Kseniya Mikhailovna named them "cryptocrystal-

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line" deposits. This gave rise to a new scientific direction—an electrochemical reduction of poorly soluble compounds.

Since the beginning of the 1950s, the laboratory staged experiments on chemical catalysis of the reduction of nickel and cobalt ions by hypophosphite, borohydride, or dimethylaminoborane, which were of great importance for the air-space, electronic, and medicine industries. To optimize these processes, Gorbunova carried out electrochemical and mass-spectrometric studies of the mechanism of hydrolysis of hypophosphite and borohydride and its derivatives, which led to the development of some new technological processes. These studies were generalized in two books and quite a number of papers.

The problem of interaction of active gas media with metals and semiconductors and the effect of gas media on electrophysical properties of semiconductors occupied the important place in Gorbunova's studies. She took part in the development of new methods for processing of germanium and silicon surfaces, which refined characteristics of semiconductor-based devices. The precision gravimetric technique for studying the oxidation kinetics of metals and semiconductors, developed in the Laboratory, made it possible to formulate a microscopic theory of metal oxidation, which took into account partial vaporization of volatile oxides.

Kseniya Mikhailovna actively participated in many Russian and international conferences, where she delivered many plenary lectures and reports. She was member of the International Society of Electrochemistry, Scientific Council on Electrochemistry of the Academy of Sciences of the USSR, and an active member of the Scientific Council of the Institute. Her deep and witty comments, pointed remarks on fundamental problems always roused admiration of the audience.

Having exceptional pedagogical talent, Kseniya Mikhailovna spent much effort in training young scientists. For 20 years, she read Physical Chemistry at the Moscow Institute of Geological Prospecting. Many of those who work at the Institute of Physical Chemistry of the Russian Academy of Sciences still remember her interesting lectures full of advanced information, which she read for colleagues and post-graduate students. Numerous pupils of Gorbunova are now candidates and doctors of science and work at research institutes, universities, and industrial associations both in Russia and abroad.

The scientific achievements of K.M. Gorbunova were highly merited. She was awarded two Orders of Red Banner of Labor and several medals and given the title of Honored Scientist and Engineer of the Russian Federation.

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