PREFACE

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Among Russian scientists, an outstanding place is occupied by the corresponding member of the Academy of Sciences of the USSR, Sergei Vasil'evich Karpachev (1906–1987). He is by right considered among those who have founded the scientific school on electrochemistry in the Ural district. His scientific activities were associated with electrochemistry of molten salts and solid electrolytes.

Karpachev became aware of his scientific goals as soon as being a student and a laboratory assistant at the Faculty of Chemistry of the Ural Industrial Institute. In 1932–1948, he was the head of the Laboratory of Electrochemistry of Molten Salts of the Ural Branch of the Academy of Sciences of the USSR, since 1941 to 1948, he was the chairman of the Department of Physical Chemistry in the Ural State University; in 1949–1956, he was directed to a plant of the Ministry of Medium Machine Building, where he worked for several years as the head of the Central Plant Laboratory. In 1963, Karpachev became the head of the Insti-

tute of Electrochemistry of the Ural Branch of the Academy of Sciences of the USSR, where he worked up to his last days. In 1965, he founded the world first laboratory of electrochemical kinetics in solid electrolytes. In 1970, he was selected as the corresponding member of the Academy of Sciences of the USSR.

Studies accomplished by Karpachev in the 30s–40s of the past century played the key role in the development of modern methods of studying molten salts. They pointed out to the necessity of maintenance of an inert atmosphere, stressed the advantages of working with halogen electrodes, and demonstrated the importance of potentiometry. They outlined the main directions of electrochemistry of molten salts, namely, electrolyte properties, the interaction of metals with molten salts, the kinetics of cathodic and anodic processes, interface phenomena, and applied aspects of high-temperature electrochemistry.

Karpachev initiated and carried on the pioneering studies in the field of electrochemical kinetics in solid electrolytes. His ideas served as the basis of numerous studies, namely, thermodynamics of electrochemical cells with solid electrolytes, polarization of gas (oxygen and hydrogen) electrodes, impedance of the electrode/oxide electrolyte interface, electrocapillary phenomena at the interface of liquid metals with solid electrolytes, the capacitance of the electric double layer in these media, the kinetics of oxygen exchange reactions between a solid electrolyte and the gas phase, the nature of electronic conduction in solid electrolytes, and transport phenomena in mixed electronic-ionic conductors. The development by Karpachev of concepts in the field of theoretical electrochemistry of solid electrolytes had determined in many respects their practical use in high-temperature fuel cells, electrolyzers, and gas sensors.

For a long time, Karpachev headed the Section of Solid Electrolytes in the Scientific Council of the Academy of Sciences of the USSR on physical chemistry of ionic melts and solid electrolytes, was the member of the International Society of Electrochemistry and the member of the Editorial Board of Journal *Elektrokhimiya*.

The original data published in this issue were obtained in different Russian and foreign scientific centers and are closely related to the scientific legacy of S.V. Karpachev, the corresponding member of the Academy of Sciences of the USSR.

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