In memoriam—Claudio Maria Mari (1947–2020)

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Graduated in industrial chemistry in 1972, Claudio Maria Mari began his academic career in the same year as a technician at the Institute of Electrochemistry and Metallurgy of the University of Milan. In the 1980s, he spent periods of study at the Imperial College London, working with Brian Steele, and at the European Institute for Transuranium Elements in Karlsruhe. In 1985 he became Associate Professor at the University of Milan, a role he held until his transfer to the new University of Milano-Bicocca, where in 1994 he was one of the founders of the Materials Science Department, becoming full professor in 2005.

Claudio Maria Mari was the author of important contributions in research on solid-state electrochemistry. A pioneer in the use of impedance spectroscopy to determine the electrical

properties of materials, his scientific interests have been mainly directed to ion conduction in solid electrolytes and regarding transport processes in metal oxides for sensor applications and fuel cells.

Few years after his graduation, he started working on the study of the thermodynamic properties of the oxides, on the measurement of the oxygen content in pure inert gases, using solid-state galvanic cells, and on the catalytic properties of some oxides vs. electrochemical oxidation reactions. A technological application of the results of this work was the realization of an electrochemical oxygen sensor that was brought to industrialization and production. In collaboration with the European Institute for Transuranium Elements in Karlsruhe, he carried out also studies on the electrochemical determination of plutonium in spent nuclear oxide-based fuels, with the final application of an international patent. From the late 1970s, he started working on the kinetics of the electrochemical processes for the selective oxidation of organic materials, opening a new field in solid-state electrochemistry that granted Claudio Maria Mari high international visibility. In the next years, and up to the 2000s, he studied the structural, electrical, and spectroscopical properties of inorganic materials that presented potential interest for ionic transport and began his activity on solid-state sensors, using semiconducting oxides as the active sensing materials, a work that emphasized also the important role of the surface science on the design of good chemical sensors.

From the beginning of the 2000s, after the transfer to Milano-Bicocca, Claudio Maria Mari then dedicated himself to the electrochemical characterization of other functional materials, such as oxides and phosphates for electrodes in sensors, rechargeable batteries, and conductive polymers for optoelectronic and photovoltaic applications. In particular, his studies focused primarily on oxide ion conductors for lithium and oxygen (NASICONs, YSZ-based composites, LSGM), membranes for the determination of Rh in air, and semiconductor oxides for gas detection (SnO₂). Subsequently, with the growth of the research group, conductive polymers (polythiophenes) for electrochromic applications were

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studied, with participation in large consortia in several FP6 and FP7 European projects. In the last part of his career, Claudio Maria Mari contributed in important investigations on electrode materials for secondary batteries, like LiMnO_2 for lithium ion systems or the use of oxides in negative electrode for the development of sodium ion batteries.

Despite he has always been critical of the modern “publish or perish” trend, preferring applied research and the drafting of very complete and in-depth scientific works, Claudio Maria Mari has published more than 200 papers and 7 patents. A profound expert of thermodynamics, he has taught chemists, industrial chemists, and materials scientists throughout his career, supervising more than 100 master and PhD students and funding the group of Solid-State Electrochemistry at the University of Milano-Bicocca. His distinctive teaching method focused more on concepts than formulas, preferring creativity in solving problems over demonstrations. His passion for teaching did not end with the conclusion of his academic career. In fact, in recent years, Claudio has enthusiastically dedicated himself to assisting middle school students in situations of socio-family distress.

Driven by his curiosity and desire to know, Claudio was a passionate traveler. Borneo, Qatar, China, India, and New

Zealand, he loved to combine work commitments (meetings, conferences) with the possibility of visiting new countries, respectful of local traditions and customs. As a young, Claudio was a football player and a skier, while later he became passionate about golf and diving. Claudio has never been afraid to embark on new experiences, facing them with determination and a smile, always with fun. A lover of good food, always looking for new culinary experiences, he was an excellent cook and a deep connoisseur of the best restaurants in Milan.

His character was frank, sharp, intelligent, brilliant, and sharp. He was ironic, at times sarcastic, direct, less incline to compromises, and honest. We will always remember him as an outstanding scientist, a brilliant student, an amazing advisor, a respectable colleague, and a good friend.

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