# ŽELJKO ČUPIĆ

Full member of Serbian Academy of Nonlinear Sciences since end of 2015. Dr. Željko Čupić was born on August 13, 1963 in Belgrade, where he graduated from the Faculty of Physical Chemistry in 1989 with a paper entitled "Numerical analysis of oscillatory processes on Gray's variant of the autocatalyst", and obtained his master's degree in 1993, defending a thesis entitled "The effect of a polymer catalyst on the oscillatory flow of the Bray-Liebhafsky reaction", and he received his doctorate in 1998, defending his doctoral thesis entitled "Modelling of the mechanism of oscillatory catalytic processes with application to the hydrogen peroxide decomposition reaction".

Since 1990, he has been working continuously at the Institute of Chemistry, Technology and Metallurgy (IHTM) - Center for Catalysis and Chemical Engineering. He was elected as a Principal Research Fellow in 2007. From 2010 to 2021, he held the position of President of the Scientific Board, and from the end of 2021, he assumed the position of President of the Scientific Council of IHTM.

In June 2014, he was awarded the Distinguished Member of the Society of Physical Chemists of Serbia award. At the end of 2015, he was elected as a member of the South Slovenian Academy of Nonlinear Sciences, where he holds the position of general secretary. In 2016, he was elected as a member of the Scientific Society of Serbia, where he was in 2017-2019, held the position of General Secretary, and since 2019 he is the Secretary of the Department of Natural and Mathematical Sciences in this Society.

He is engaged in research in the field of Nonlinear Sciences and Catalysis, and especially in the modeling of complex processes. More specifically, his research mainly includes the phenomenology and theory of self-organization of non-linear non-equilibrium systems and their dynamics: homogeneous oscillators (Bray-Liebhafsky and Belousov-Zhabotinsky) and biological oscillators (Hippotalamo-pituitary-adrenal system). In the field of catalysis, apart from oscillatory reactions, he was particularly involved in the research of catalysts for partial oxidation and hydrogenation of edible oils.

In the period 2004-2005. Dr. Čupić managed the national Project 1807 (Synthesis, characterization, testing and modeling of heterogeneous catalysts for partial and complete oxidation of organic compounds), and in the period 2006-2010. the Project 142019 (Synthesis, characterization and testing of catalytic properties of specially designed materials). He participated in the work of a number of other projects financed by the Ministry of Science of Serbia, as well as in bilateral projects of inter-academic cooperation with Bulgaria (starting in 1999), Russia (2000-2010) and Romania (2006). He also participated in TEMPUS PROJECT no 1234-92/2 (Nonlinear Dynamics in Chemistry and Biosciences, 1992-93). As one of the two representatives of Serbia, he was engaged in the COST project CM0701 "Cascade Chemoenzymatic Processes - New Synergies Between Chemistry and Biochemistry", in the period 2010-2012, and in the period 2013-2017 he was also engaged in the COST project CM1304 "Emergence and Evolution of Complex Chemical Systems". Since 2022, he has been

managing project 7743504 entitled "Physicochemical aspects of rhythmicity of neuroendocrine systems: Dynamic and kinetic research of reaction networks and the main compounds underlying them" from the Ideas program, financed by the Science Fund of the Republic of Serbia.

During March 2012, he gave an invited lecture at the Chemistry Department of the University of Bologna in Italy, entitled "Bray-Liebhafsky oscillatory reaction. Relevance of the perturbation sensitivity for analytical applications" and then stayed in Bologna during October 2013 as part of a bilateral project between the University of Belgrade and the University of Bologna, when he held a series of lectures under the common title "Non-linear phenomena in chemistry and their analytical applications". During February and March 2013, he also stayed at the Karolinska Institute in Stockholm, Sweden, thanks to a scholarship from the Rajko and Maj Đermanović Foundation, and on that occasion he collaborated with Prof. Vladan Vukojević and Prof. Lars Terenijus on modeling the effect of alcohol on the endocrine system.

Dr. Željko Čupić is a member of the Presidency of the Society of Physical Chemists of Serbia (since 2003) and in the same Society, founder and President of the Catalysis Section (since 2002), and since 2014, Secretary of the Society. In the period 1995-2002. He was the Secretary of the Section for Physical Chemistry of Materials. He was a member of the Executive Committee (2002, 2004 and 2006) and Vice-President (2008) and President (2010, 2012, 2014, 2016, 2018, 2021 and 2022) of the Scientific Committee at international conferences of the Society of Physical Chemists of Serbia in fundamental and applied physical chemistry. and one of the editors of the Proceedings Physical Chemistry 2010, 2014, 2016, 2018, 2021 and 2022, and at the international conference Selforganization in nonequilibrium systems (2004) he was the President of the executive committee and one of the editors of the Proceedings under the same name as the Conference, as well as the books papers from the 2005 IWON scientific conference organized by IHTM. In 1995, he was a member of the Organizing Committee of the National Conference of the Society of Physicochemists of Serbia Self-organization of non-equilibrium processes. In 2011, he was the representative of the Society of Physical Chemists of Serbia in the European Federation for Catalysis - EFCATS. On behalf of the Presidency of the Society, he is in charge of editing the Society's internet presentation.

In the scientific journal Hemijska Industrija of the Association of Chemical Engineers of Serbia, Dr. Ž. Čupić was a member of the Editorial Board (from 2008 to 2022). Presently he is a member of the Editorial Advisory Board in the Reaction Kinetics, Mechanisms and Catalysis, Journal published by Springer. He was a reviewer of several international journals, at the invitation of the Ministry of Science of Serbia, he reviewed several project proposals from natural sciences at the national level, and at the invitation of the Bulgarian Science Fund, he also reviewed several national projects of Bulgaria.

Dr. Z. Čupić is employed at the Faculty of Physical Chemistry of the University of Belgrade as a lecturer in doctoral studies and as a mentor for doctoral and master's theses, graduate and master theses, as well as seminar papers. Since 2004, as part of the optional subject Dynamics of Nonlinear Processes, at the invitation of the subject teacher, he has given lectures to undergraduate and master's students on oscillatory reactions in catalytic systems and chaos theory. Within the course of New Physicochemical Methods, since 2007 he has been lecturing under the title Methods of examining the dynamics of complex reaction systems, to students of the first year of Doctoral studies. During his doctoral studies, he was also hired to teach the subject Modeling and simulation of complex processes. He is the co-author of the university

textbook: Lj. Kolar-Anić, Ž. Čupić, V. Vukojević, S. Anić, Dynamics of nonlinear processes, Faculty of Physical Chemistry, University of Belgrade, 2011 (400 pages).

**Scientific Results**: As of the end of April 2023, he has published 269 peer-reviewed scientific papers, including 7 chapters in international monographs and 81 papers in international scientific journals of class M20. According to the Google scholar database, it was cited 1147 times and its h-index is 18.

**Contribution to nonlinear sciences**: Dr. Čupić devoted his research almost entirely to the kinetics and dynamics of non-linear non-equilibrium reaction systems. More closely, his researches predominantly include the phenomenology and theory of self-organization of homogeneous oscillators (Bray-Liebhafsky and Belousov-Zhabotinsky) and biological oscillators (Hippotalamo-pituitary-adrenal system).

**List of 5 selected works**


1. Željko Čupić, Vladimir Marković, Ana Ivanović, Ljiljana Kolar-Anić, "Modeling of the Complex Nonlinear Processes: Determination of the Instability Region by the Stoichiometric Network Analysis" in: Christopher R. Brennan, Ed. Mathematical Modelling, Nova Science Publishers Inc., New York, (2013) pp. 111-178, ISBN: 978-1-61209-651-3
2. Željko Čupić, Stevan Maćešić, Katarina Novaković, Slobodan Anić, and Ljiljana Kolar-Anić, Stoichiometric Network Analysis of a Reaction System with Conservation Constraints, Chaos: An Interdisciplinary Journal of Nonlinear Science, CHAOS 28(8), 083114 (2018). doi: 10.1063/1.5026791
3. Ljiljana Kolar-Anić, Željko Čupić, Slobodan Anić, Guy Schmitz: "Pseudo-steady states in the model of the Bray-Liebhafsky oscillatory reaction." J.Chem.Soc.,Faraday Trans. (Sada: Physical Chemistry Chemical Physics), 93 (1997) 2147-2152.
4. S. Jelić, Ž. Čupić, Ljiljana Kolar-Anić: " Mathematical modeling of the hypothalamic-pituitary-adrenal system activity " Mathematical Biosciences, 197 (2005) 173-187.
5. Željko Čupić, „ Nelinearna dinamika u primenjenim fizičkohemijskim procesima", Hemijska industrija, 63 (2009) 467-475


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