Dušan Strmčnik, National Institute of Chemistry, Ljubljana, Slovenia.

Dušan Strmčnik is a senior research fellow at the National Institute of Chemistry in Ljubljana, where he leads the Laboratory for Electrochemical Interfaces. He received his PhD in Chemistry from the University of Ljubljana in 2007, with a significant part of his doctoral research conducted at Argonne National Laboratory in the United States. He subsequently spent fifteen years at Argonne, progressing from a postdoctoral researcher to a staff scientist in the Materials Science Division. In 2022, he returned to Slovenia and joined the National Institute of Chemistry. Dušan is a co-author of more than 75 scientific publications and a co-inventor on eight US patents and patent applications covering modified fuel-cell electrodes, advanced electrocatalysts, electrochemical purification and characterization technologies, and battery materials. He is also a Management Committee member and Working Group Leader in the European COST Action EU-CONCERT, which aims to connect well-defined experimental systems with theoretical descriptions of electrocatalytic interfaces.

His research focuses on understanding and deliberately designing the structure of electrochemical interfaces for energy conversion and storage. Rather than considering the interface as a passive consequence of bringing an electrode into contact with an electrolyte, his work explores how its properties can be predetermined by controlling the atomic structure and near-surface composition of the electrode, introducing molecular or inorganic surface modifiers, and tailoring the composition and organization of the electrochemical double layer. Particular attention is given to the combined effects of covalent bonding, non-covalent interactions, interfacial water, electrolyte ions and impurities on catalytic activity, selectivity and stability.

His current research seeks to connect insights obtained from well-defined model surfaces with the development of practical PGM-free catalysts and devices. A major focus is the identification and control of the dynamic surface states formed on nickel during alkaline hydrogen evolution and oxidation, and the translation of this understanding into catalyst materials and alkaline water-electrolysis systems operating at technologically relevant current densities. His research also extends to lithium-ion batteries, carbon dioxide conversion and other electrochemical technologies in which the structure and evolution of the electrode–electrolyte interface determine performance.