



Professor Lin Zhuang

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Research fields: electrocatalysis and electrochemical energy technologies

Professor Lin Zhuang is Chuan-Sin Cha Chair Professor and Dean of the College of Chemistry and Molecular Sciences at Wuhan University. He received his BSc in Chemistry in 1993 and his PhD in Electrochemistry in 1998, both from Wuhan University. He joined the University in 1998 and was appointed Professor in 2003. His research is centred on electrocatalysis and electrochemical energy technologies for net-zero and carbon-negative applications, including fuel cells, water electrolysis and CO₂ reduction.

Professor Zhuang is recognised for sustained contributions to *fundamental electrocatalysis*. Since the 2000s, he has combined density functional theory with experimental electrochemistry to examine structure-activity relationships in electrocatalysts. His work has addressed lattice-strain, morphology and quantum-size effects, including the structural collapse and activity loss of Pt nanoparticles of around 1 nm, which contributed to a reassessment of optimal sizes for Pt nanocatalysts. He also introduced *Fermi softness* as a descriptor for local reactivity on metal surfaces. More recently, his group has used operando ATR-FTIR, Raman spectroscopy and electrochemical impedance spectroscopy to study reaction mechanisms at electrode/polyelectrolyte interfaces.

In parallel, Professor Zhuang has made early and influential contributions to *alkaline polymer electrolyte-based hydrogen-energy technologies*. In 2003 he proposed alkaline polymer electrolyte fuel cells (APEFCs) as an alkaline counterpart to proton-exchange membrane fuel cells, seeking to reduce reliance on noble-metal catalysts while avoiding the carbonation problems of concentrated KOH electrolytes. In 2008 his group reported the first APEFC prototype operating without noble-metal catalysts. Over the past two decades, his team has advanced the molecular design of alkaline polymer electrolytes, ion-conducting channels and catalysts for alkaline energy conversion; their work has shown that hydroxide-ion conduction can approach proton-level conductivity at fuel-cell operating temperatures.

These technologies have progressed from scientific principles to materials, devices and commercial use. The *Alkymer® membrane and ionomer products* developed by his team have been commercialised and adopted by more than 200 institutions and companies worldwide for research and technology development. They have supported work on fuel cells, pure-water electrolysis, water electrolyzers and CO₂/pure-water co-electrolysis. Recently, a 1 MW water electrolyser using Alkymer® and non-precious-metal catalysts developed in Professor Zhuang's laboratory was released to the market, marking an important step in the translation of alkaline polymer electrolyte-based electrochemical hydrogen-energy technologies.

Professor Zhuang has published more than 250 peer-reviewed articles in journals including *Nature Energy*, *Proceedings of the National Academy of Sciences*, *Journal of the American Chemical Society*, *Angewandte Chemie* and *Energy & Environmental Science*, with more than 23,000 citations. He holds more than 30 authorised invention patents, of which six have been transferred or licensed for industrial implementation. He has delivered five (plenary) keynote lectures at annual meetings of the International Society of Electrochemistry (ISE) and the Electrochemical Society (ECS).

Professor Zhuang was elected Fellow of ISE in 2025 for his contributions to fundamental electrocatalysis and to the development of alkaline polymer electrolyte technologies. He is also a Fellow of the Chinese Chemical Society. His honours include the Electrochemistry Contribution Award of the Chinese Society of Electrochemistry (2024), the First-Class Natural Science Award of Hubei Province (2024), the Chang Jiang Scholarship (2015), Science and Technology Innovation Leader of the Ministry of Science and Technology of China (2014), and National Distinguished Young Scientist (2011). He has served as Executive President of the Chinese Society of Electrochemistry, Chair of the ECS China Section, Vice Chair of the ISE Physical Electrochemistry Division and Regional Representative of China, and as editor of *ACS Sustainable Chemistry & Engineering* and editorial-board member of a number of international journals, including *Electrochimica Acta*, *Journal of Electroanalytical Chemistry*, the *Journal of Physical Chemistry*, etc.