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Candidate Vision Statement

At the Interface: Electrochemistry for an Intelligent and Sustainable World

Dear colleagues,

It is a great honor to be nominated as a candidate for President of the International Society of Electrochemistry (ISE). I accept this nomination with gratitude, humility, and a deep sense of responsibility to our global community.

Electrochemistry is the science of interfaces. At an electrified interface, electrons, ions, molecules, materials, and energy meet; from that meeting, transformation becomes possible. My vision is that ISE should also be an interface: where fundamental insight becomes practical impact, where academia meets industry, where energy science meets life science, where regions of the world meet as partners, and where human creativity meets artificial intelligence.

The world is asking more from electrochemistry than ever before. The energy transition, climate change, environmental degradation, resource scarcity, and the need for sustainable industry are no longer abstract challenges. They are urgent realities. Batteries, fuel cells, hydrogen technologies, CO₂ conversion, electrosynthesis, corrosion protection, sensors, water treatment, and the circular use of critical materials all depend on electrochemical science. At the same time, electrochemistry is becoming increasingly important in biology, medicine, diagnostics, neural interfaces, and the understanding of living systems. The future of ISE must reflect this full breadth.

My vision is for ISE to become the world's most important interface for electrochemical science, technology, education, and society. To realize this vision, I would focus on four strategic interfaces.

The first interface is between fundamental excellence and societal impact. ISE must remain a society of rigorous science. The deepest understanding of electrified interfaces, transport, kinetics, molecular processes, materials, and devices is the foundation of every useful technology. At the same time, ISE should speak more clearly to society about why electrochemistry is indispensable for a sustainable future. We should celebrate energy electrochemistry, but we should not allow ISE to be seen only as a battery or energy society. Analytical electrochemistry, bioelectrochemistry, corrosion, electrochemical

engineering, molecular electrochemistry, materials electrochemistry, and fundamental interfacial science are all essential parts of our identity.

The second interface is between regions and sectors. ISE has strong roots in Europe and a truly international membership across Asia, the Americas, Australia, Africa, and beyond. A President should not favor one region over another; a President should create pathways through which each region benefits from the strengths of all. I come from China, where electrochemistry is deeply connected with large-scale technological transformation, especially in batteries, electric vehicles, hydrogen technologies, electrocatalysis, and sustainable manufacturing. China now hosts one of the world's largest electrochemical innovation ecosystems.

As Executive Vice Chair of the Chinese Society of Electrochemistry (CSE), whose membership is comparable in scale to ISE, I have witnessed the remarkable growth of this community. Last year, the national electrochemistry conference that I hosted in Wuhan attracted about 4,000 participants. If elected, I would work to build deeper and more systematic ISE–CSE cooperation: joint symposia, young researcher exchanges, industry–academia forums, shared educational activities, and stronger participation of industrial partners in ISE events. This is not a regional agenda or a one-way connection. It is a global bridge, opening one of the largest electrochemical communities to ISE members from every region and strengthening ISE as a truly worldwide society.

The third interface is between electrochemistry and artificial intelligence. AI will not replace electrochemists, but it will reshape how we do electrochemistry. Many of our most difficult problems are transient, nonlinear, multiscale, and hidden in complex signals. AI can help us interpret operando data, capture fast electrochemical processes, build digital twins of batteries and reactors, discover materials, optimize interfaces, and extract mechanistic information from noisy and incomplete measurements.

The impact of AI will extend beyond energy. In batteries, it can transform health diagnosis, safety prediction, and lifetime management. In bioelectrochemistry, it can help us decode ionic and electronic signals from cells, tissues, and neural systems, enabling new biosensors, electrochemical diagnostics, bioelectronic medicine, electrochemical therapies, and brain–machine interfaces. I would support an ISE “Electrochemical Intelligence” initiative, including workshops, summer schools, data-standard discussions, benchmark problems, and special sessions at ISE meetings. AI should not be a black box that replaces mechanism; it should be a new pathway to reveal mechanisms that were previously hidden.

The fourth interface is between today's leaders and the next generation. We are entering a golden age for electrochemistry. In China, I see many excellent students choosing electrochemistry as their first field, and similar enthusiasm is growing worldwide. But electrochemistry is not an easy discipline to learn. It requires

thermodynamics, kinetics, mass transport, interfacial science, instrumentation, modeling, data science, and practical intuition. ISE should help define and disseminate high-quality electrochemical education worldwide: global online lectures, curriculum resources, ISE summer schools, mentorship programs, and stronger connections among students, universities, laboratories, and industry.

This educational mission must also be inclusive. Young electrochemists, women scientists, researchers from underrepresented regions, and colleagues from industry should all see ISE as their home. Every division, every region, and every generation should feel visible and valued. A brilliant future for ISE will be built not by one person, but by a community that trusts one another and moves forward together.

Leadership of ISE should be open, inclusive, and action-oriented. I would listen carefully to our members, respect the strong traditions of the Society, and work with the Executive Committee, divisions, regional sections, journals, and industrial partners to turn vision into concrete progress.

At an electrode, potential becomes current only when a pathway is created. For ISE, vision becomes impact only when a community moves together. I would be deeply honored to help build that pathway — toward an ISE that is scientifically excellent, globally connected, intellectually courageous, and ready to lead electrochemistry into an intelligent and sustainable future.

Sincerely,

A handwritten signature in black ink, appearing to read 'Lin Zhuang', with a stylized, cursive script.

Lin Zhuang