

## 2019 Hans & Marlies Zimmer International Scholar

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### Professor Patrick Unwin

University of Warwick, Coventry, England

**About:** Patrick Unwin is Professor of Chemistry (since 1998) and Director of the Center for Doctoral Training in Molecular Analytical Science (since 2014) at the University of Warwick, where he founded the Electrochemistry & Interfaces Group. Since 1996, more than 70 PhD students have graduated under Pat's supervision, along with 35 postdoctoral fellows who have been group members. Pat's group is particularly well known for pioneering innovative nanoscale electrochemical imaging techniques that can probe active sites on electrodes unambiguously, on the one hand, and provide new descriptors of living cells, on the other. Pat is the author of almost 400 papers and book chapters. He has won a number of awards, including the Marlow Medal, Corday-Morgan Medal, Barker Medal and Tilden Prize from the Royal Society of Chemistry (RSC), and the Vetter Prize and Experimental Electrochemistry Prize from the International Society of Electrochemistry (ISE). He was the 2018 Reilley Awardee (Society of Electroanalytical Chemistry), the first from the UK. A Fellow of the RSC and ISE, Pat is a member of a number of editorial committees including Annual Review of Analytical Chemistry and Langmuir.

## Zimmer International Scholar Lecture

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### A New Look at Interfacial Processes

Interfacial physicochemical flux processes are found across the science spectrum: from life itself – the functioning of living cells – to some of the most important challenges facing mankind – the development of new energy storage and conversion technologies to combat climate change. This amazing age of microscopy allows us to visualize the structure and properties of surfaces and interfaces as never before, often revealing a high degree of complexity and heterogeneity. At the same time, interfacial chemical fluxes that control the functioning of interfaces are much more difficult to elucidate. Visualizing such hidden fluxes and discovering their relation to interface structures would open up a new window on interfacial processes, improving our understanding of living systems, on the one hand, and enabling the rational design of new electrochemical energy technology systems, on the other. To this end, this lecture sets out some major challenges in electrochemistry and interfacial science. It introduces new approaches for probing and analyzing interfacial chemical fluxes, based on the use of correlative electrochemical multi-microscopy to reveal structure-activity at the nanoscale. Adopting a general philosophy, it explains why such methods are important, and presents a roadmap that is widely applicable to surfaces and interfaces found in electrochemistry and electrocatalysis, materials science and the life sciences.