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Principles and Applications of Fast Electrochemical Impedance Spectroscopy and Its Perspectives in Electrochemical Measurements

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The electrochemical impedance spectroscopy (EIS) addresses a fundamental aspect, *i.e.*, the electrode reaction kinetics, in electrochemistry.[1] In the current state-of-the-art technique (the frequency response analysis: FRA), the whole frequency must be scanned to obtain data in a full frequency range, which requires an unjustifiably long time. For this reason, the impedance measurements of *nonstationary* systems, which would be of interest to most electrochemists, can not be made. To solve this problem, we developed a novel fast impedance measurement technique.[2] The technique, however, needs to satisfy a number of requirements, and the system we developed satisfy all these requirements. The technique was satisfactorily applied to a real time monitoring of impedances during a complex electrochemical reaction, such as electrochemical oxidation of aniline, which causes the electrode/electrolyte interface to continuously change.[3] In this presentation, we will discuss the principles involved and its otherwise impossible applications to a truly nonstationary system, as well as its future perspectives in electrochemical measurements.

References

1. S.-M. Park and J.-S. Yoo, *Anal. Chem.*, an A-page article, in press (2003).
2. (a) J.-S. Yoo and S.-M. Park, *Anal. Chem.*, 72, 2035 (2000) and (b) *ibid.*, 73, 4060 (2001).
3. J.-S. Yoo and S.-M. Park, *Anal. Chem.*, 75, 3294 (2003).