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Electrochemiluminescence sensing and light generation confined in nanochannels

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Abstract

Electrochemiluminescence (ECL) is light emission triggered by electrochemical reactions in solution: reactive species are generated by at electrode surfaces and subsequently undergo an electron-transfer reaction in solution generating the excited state of a *luminophore*, which returns to the ground state *emitting a photon*. ECL is an important technique in analytical chemistry, specifically in clinical immunosensing. More than hundred diseases and other biomarkers can be detected when antibodies are labelled with luminophores. The method is background-free and allows straightforward detection with high sensitivity in a very broad measuring range.

Practical sensing is typically performed with large immunoanalysers in hospital laboratories. Research is ongoing to shrink the ECL detection principle to handheld microfluidic devices.

We employ nanofluidic electrochemical devices for light emission by ECL [1]. By confining the reaction volume to 10 femtoliters, smallest quantities of luminophores participate in reaction. Nanoscale distances to electrode enable very efficient reaction and bright light emission as well as novel reaction pathways.

Reference

[1] H. Al-Kutubi, S. Voci, L. Rassaei, N. Sojic, K. Mathwig, *Chem. Sci.*, 2018, **9**, 8946–895.