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Retraction: Microelectrochemical cell arrays for whole-cell currents recording through ion channel proteins based on trans-electroporation approach

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Retraction of 'Microelectrochemical cell arrays for whole-cell currents recording through ion channel proteins based on trans-electroporation approach' by Tianyang Zheng *et al.*, *Analyst*, 2020, **145**, 197–205.

We, the named authors, hereby wholly retract this *Analyst* article due to concerns with the reliability of the data and the veracity of the representations in the published article. This manuscript was submitted without the permission or knowledge of Prof. Jan C. Behrends, the principal investigator in whose laboratory the experimental work was performed. Prof. Behrends was not aware of the contents of this article.

The article wrongly claims that trans-bilayer electroporation and subsequent whole-cell recording was successfully performed on cells that had been positioned using trans-bilayer dielectrophoresis (DEP). In fact, this has been impossible so far, because the mechanically unstable cell-on-bilayer configuration does not allow the necessary exchange of extracellular solution. The inset in Fig. 3 panel (a) shows a microscopic image of a cell positioned on a synthetic bilayer using DEP, but the traces shown in panels (a–c) were recorded after seeding cells at high density to increase the probability of a cell coming to rest on a bilayer and DEP was not used. In addition, contrary to what is suggested, the traces shown in panel (c) were not recorded from the same bilayer as those shown in panels (a) and (b), but came from a different experiment. The result shown in Fig. 4 does not meet the standard of a representative result, this experiment having been performed only once in the course of this study. Furthermore, a loss of whole-cell current after a few minutes was frequently observed spontaneously, without adding BaCl₂, likely due to resealing of the lipid bilayer. Thus, by any generally accepted benchmark, the conclusion implied by this result is highly doubtful.

The article wrongly states that the methods shown constitute a robust and simple novel approach to on-chip whole cell recording. In fact, success rates of initially obtaining whole-cell access are well below 50% and, as mentioned above, whole-cell access has been mostly transient, lasting a few minutes.

In addition, the article fails to clarify that the microstructures used are not novel but have been published in detail before (T. Zheng, G. Baaken, M. Vellinger, J. C. Behrends and J. Rühle, Generation of Chip Based Microelectrochemical Cell Arrays for Long-Term and High-Resolution Recording of Ionic Currents Through Ion Channel Proteins, *Sens. Actuators, B*, 2014, **205**, 268–275).

Signed: Tianyang Zheng,^{*a,b} Gerhard Baaken,^{c,d} Jan C. Behrends^c and Jürgen Rühle^b, 22nd January 2020.

Retraction endorsed by Jeanne Andres, Executive Editor, *Analyst*.

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