

F. W. Schneider, M. J. B. Hauser, J. Reising:
An Alternating Current Battery
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Abstract:

We built a true alternating current (a. c.) battery that periodically reverses value and sign of its electromotive force (e.m.f.). This a.c. battery is an electrochemical concentration cell that consists of two coupled half cells in which identical oscillating Belousov-Zhabotinsky (BZ) reactions take place isothermally at 28.0°C. The homogeneous BZ oscillations are phase shifted in order to create a potential difference between both half cells. With an increasing load the phase shift between the two half cells decreases (i.e. both oscillations tend to synchronize), consequently the amplitude of the alternating current decreases while the amplitude of the individual BZ-oscillators remain unaffected. The e.m.f. - current diagram of the a.c. battery is analogous to that of direct current batteries. Although the present frequency (period of ~ 58 s), current ($\sim \pm 25$ μ A), e.m.f. ($\sim \pm 50$ mV), and maximum power produced ($\sim 10^{-7}$ W) are low, it should be possible to construct a.c. batteries with improved performances by the use of other chemical oscillators.