Electronic Supplementary Material (ESI) for RSC Advances.

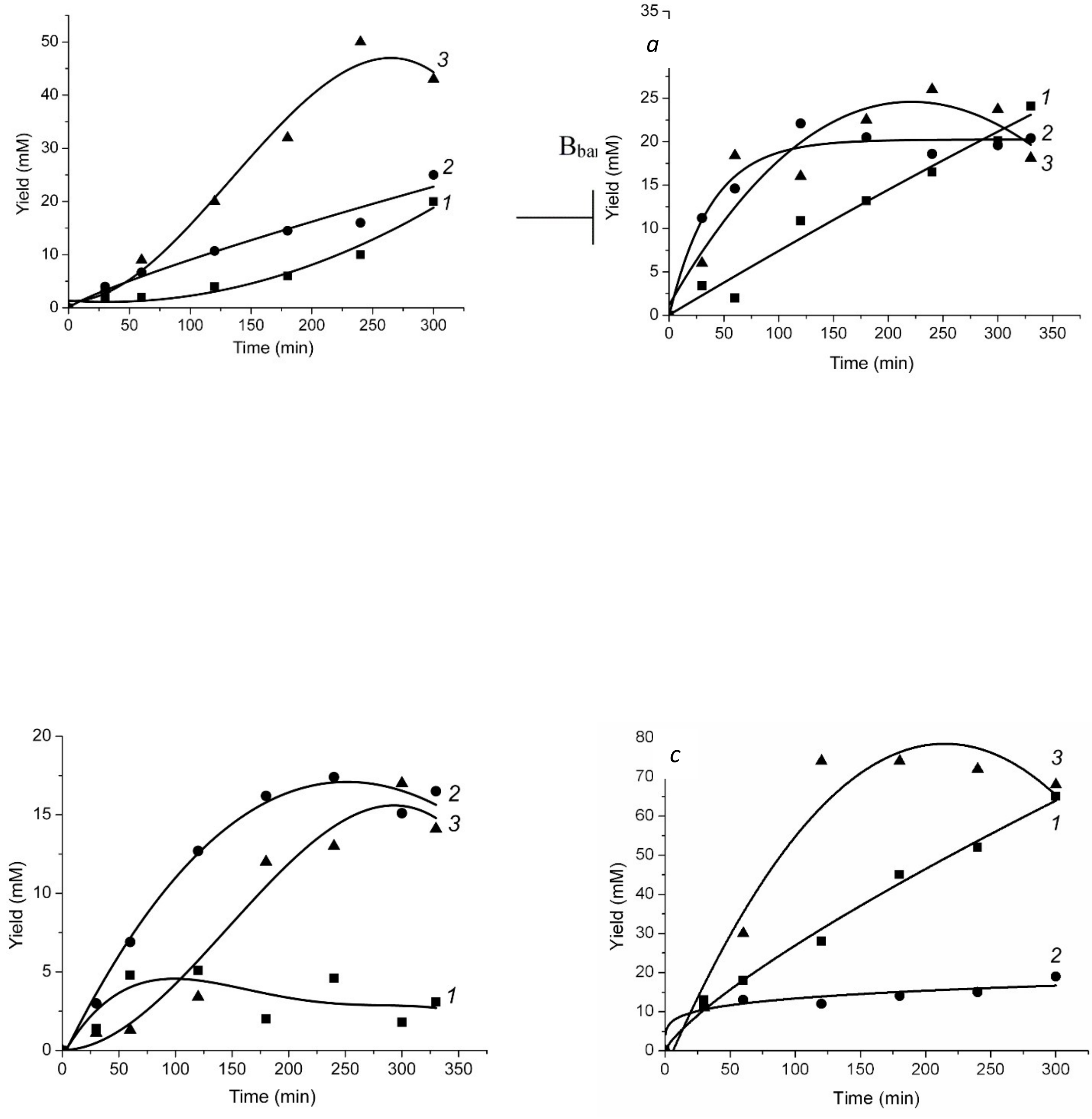


Fig. S1. The kinetics of $C_6H_{11}OH$ (*1*), $C_6H_{10}(O)$ (*2*) and $C_6H_{11}OOH$ (*3*) accumulation upon C_6H_{12} oxidation by H_2O_2, MeCN, 40 ºC.
Reaction conditions: (*a*), (*b*), (*d*): $[C_6H_{12}]_0 = [H_2O_2]_0 = 1.8$ M; (*c*): $[C_6H_{12}]_0 = 0.36$ M, $[H_2O_2]_0 = 1.8$ M. (*a*), (*b*), (*c*): $[VO(acac)_2]_0 = 0.06\times10^{-3}$ M; (*d*): $[VO(acac)_2]_0 = 0.6\times10^{-3}$ M; (*a*), (*d*): $[H_2C_2O_4]_0 = 50\times10^{-3}$ M; (*b*), (*c*): $[H_2C_2O_4]_0 = 5\times10^{-3}$ M.

Fig. S2. The relationships between VO(*acac*)$_2$/OxalH molar ratios and the resulted solutions pH.

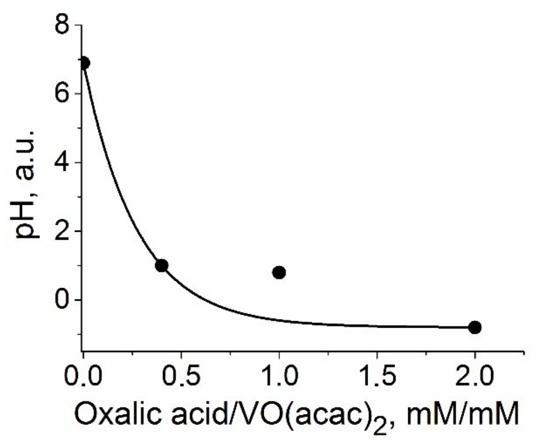
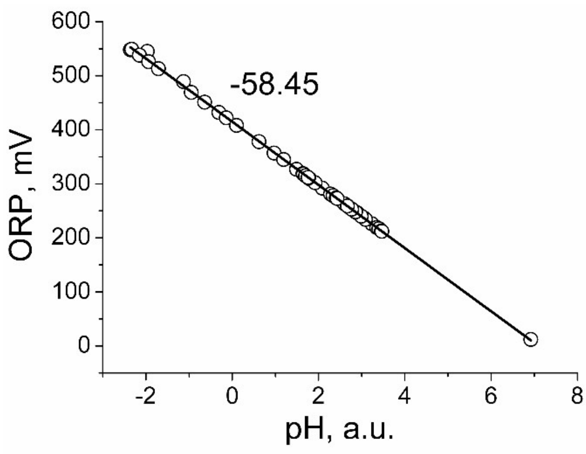


Fig. S3. Relationships between ORP of $VO(acac)_2$-based system and pH in dependence of H_2O_2 added.



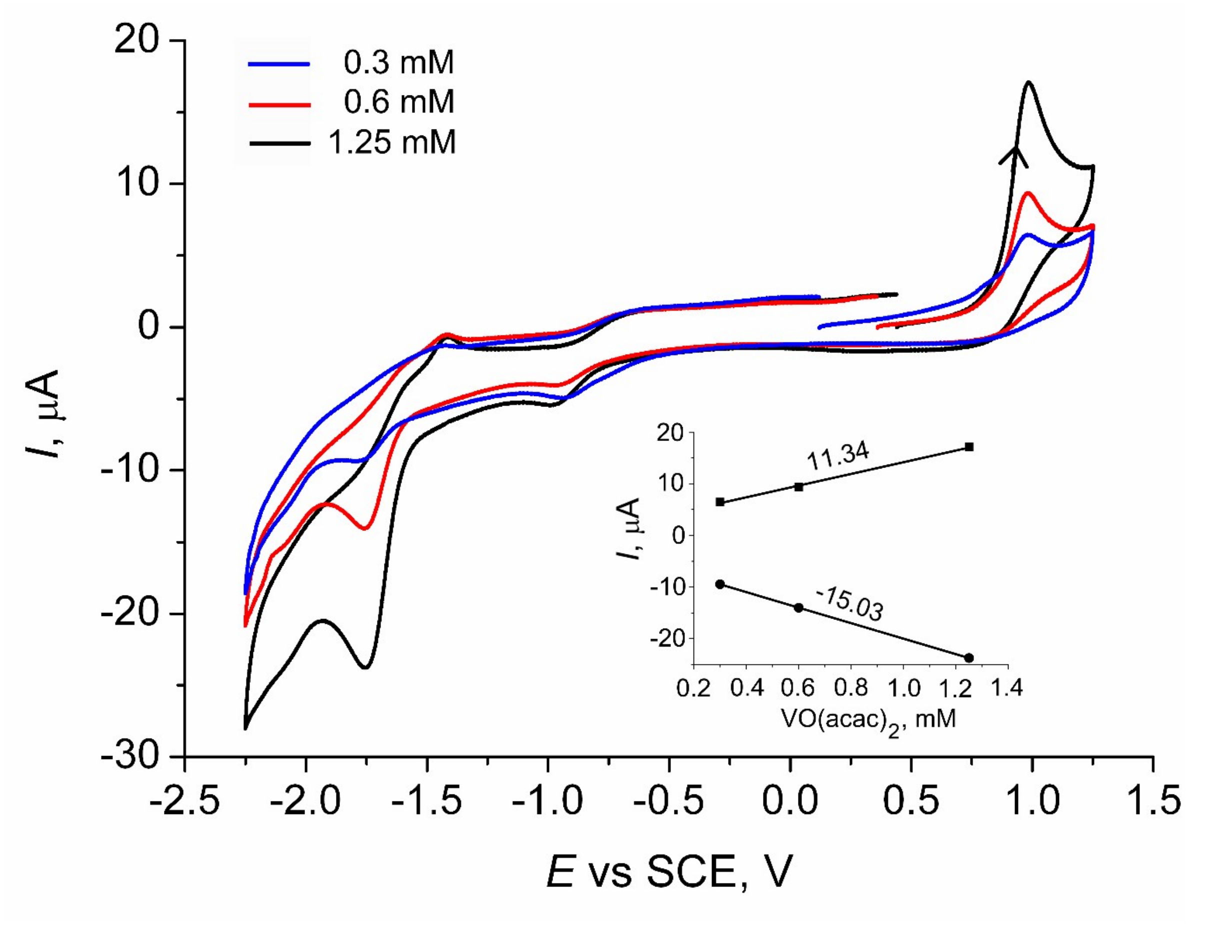


Fig. S4. CV of VO(*acac*)$_2$ solutions (anodic scans) taken for various VO(*acac*)$_2$ content (initial concentration of VO(*acac*)$_2$ in mM is indicated by the respective color), MeCN, 20 °C.
Inset: the height of 0.98 V (squares) and –1.75 V (circles) peaks in dependence of VO(*acac*)$_2$ concentration.

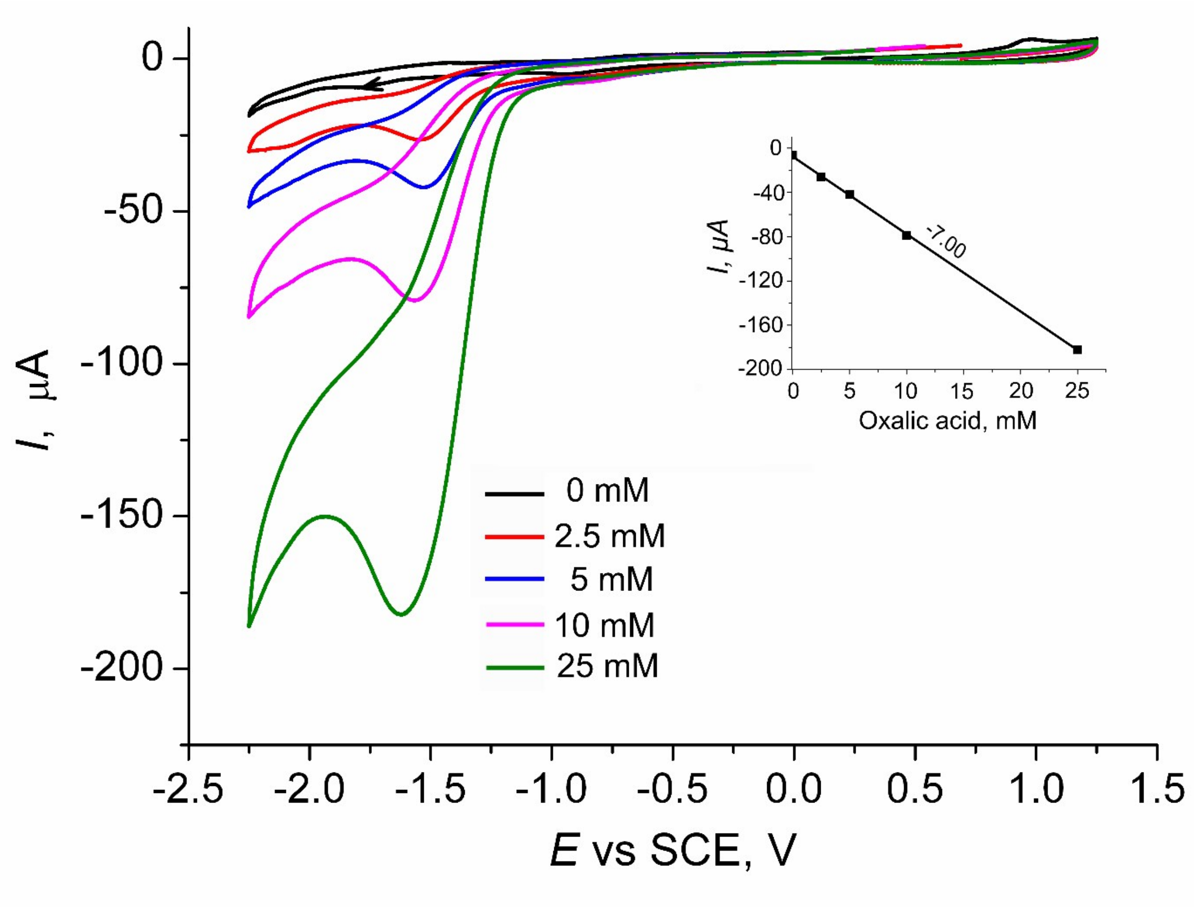


Fig. S5. CV of VO(*acac*)$_2$ + OxalH solutions (anodic scans) taken in dependence of $H_2C_2O_4$ content (concentration of VO(*acac*)$_2$ was equal 1.25 mM; initial concentration of OxalH in mM is indicated by the respective color), MeCN, 20 °C.
Inset: the height of –1.55 V peak alteration in dependence of OxalH concentration.

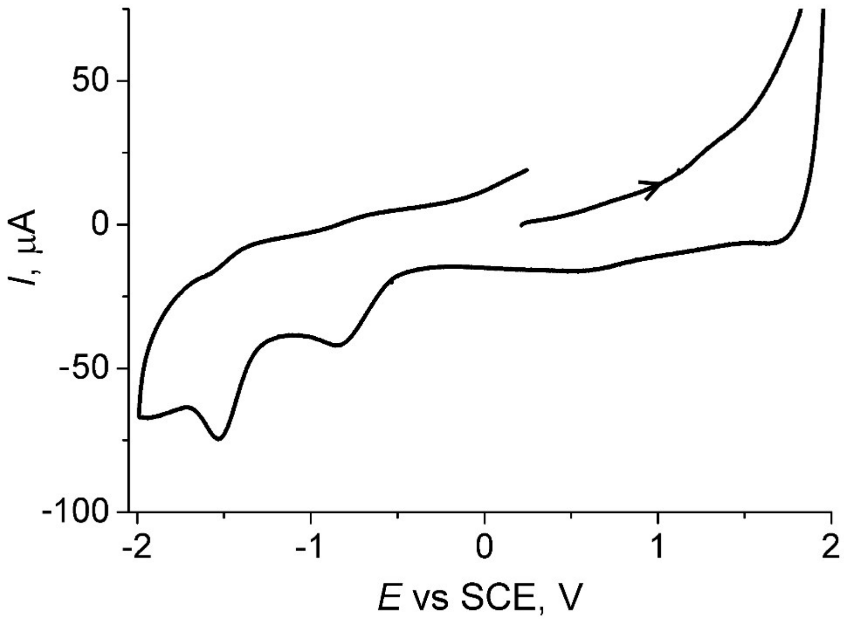


Fig. S6. CV of 2mM OxalH solutions, MeCN, 20 °C (anodic scans).

Scheme S1. The principal electrical scheme for measuring low-frequency complex dielectric spectra: dispersive power capacitor (*B, n*) and parallel ($R_V C_V$) circuit.

Parallel $R_V C_V$ circuit characterizes the bulk impedance of solution under study: electrical resistance and dielectric polarization.

Dispersive capacitor is characterized by fractional power law dispersion with small exponent *n*-1 according to the expression

$$C^*(\omega) = C_1(\omega) - jC_2(\omega) = B\{sin(\omega t) - jcos(\omega t)\}\omega^{n-1}$$

and represents dielectric response of double electrical layers formed near both solution-metal interfaces of filled up cell. Full impedance of this electrical equivalent electrical circuit could be written in the form:

$$\bar{Z}(\omega) = Z_1(\omega) - jZ_2(\omega) = \frac{1}{B\{cos(\omega t) + jsin(\omega t)\}\omega^n} + \frac{R_V}{1 + j\omega R_V C_V}$$

Thereby complex capacity of the circuit can be expressed as:

$$C^*(\omega) = C_1(\omega) - jC_2(\omega) = \left\{\frac{1}{B\{sin(\omega t) - j\, cos(\omega t)\}\omega^{n-1}} + \frac{j\omega R_V}{1 + j\omega R_V C_V}\right\}^{-1}$$