

Investigating The Kinetic Mechanisms of The Oxygen Reduction Reaction in a Non-Aqueous Solvent

Nelson A. Galiote¹, Dayse C. de Azevedo², Osvaldo. N. Oliveira Jr.², Fritz Huguenin^{1,}*

¹Departamento de Química, Faculdade de Filosofia, Ciências e Letras de Ribeirão Preto – Universidade de São Paulo, 14040-901 Ribeirão Preto (SP), Brazil

²Instituto de Física de São Carlos – Universidade de São Paulo, CP 369, 13560-970 São Carlos (SP), Brazil

SUPPLEMENTARY INFORMATION

The errors shown in Table 1 for each rate constants were determined on basis of parabolic fittings, which are displayed in Figures S1, S2, and S3. These fittings were obtained from equation below:

$$y = a(k - b)^2 + c \quad (\text{S1})$$

where k corresponds to the scan around each rate constants and y must overlays the ES values for each k scan. The values of ES are determined from Equation below:

$$ES = \frac{\sum_{i=1}^{i=n} \sqrt{y_r^2(i) + y_{im}^2(i)}}{\sum_{i=1}^{i=n} i}$$

where n is the total number of points shown in the Nyquist diagrams, i is the number for each these points, $y_r(i)$ is a function of real part of impedance, and $y_{im}(i)$ is a function of imaginary part of impedance, according with the following Equations

$$y_r(i) = \frac{Z'_{th}(i) - Z'_{exp}(i)}{Z'_{exp}(i)} \quad y_{im} = \frac{Z''_{th}(i) - Z''_{exp}(i)}{Z''_{exp}(i)}$$

where $Z'_{exp}(i)$ and $Z''_{exp}(i)$ are the real and imaginary parts of experimental impedance and $Z'_{th}(i)$ and $Z''_{th}(i)$ are the real and imaginary parts of impedance data obtained from Equation (26).

On basis of the standard error of b variable from Eq. S1, obtained from adjustments shown below using OriginPro8.6®, the errors of the rate constants were determined.

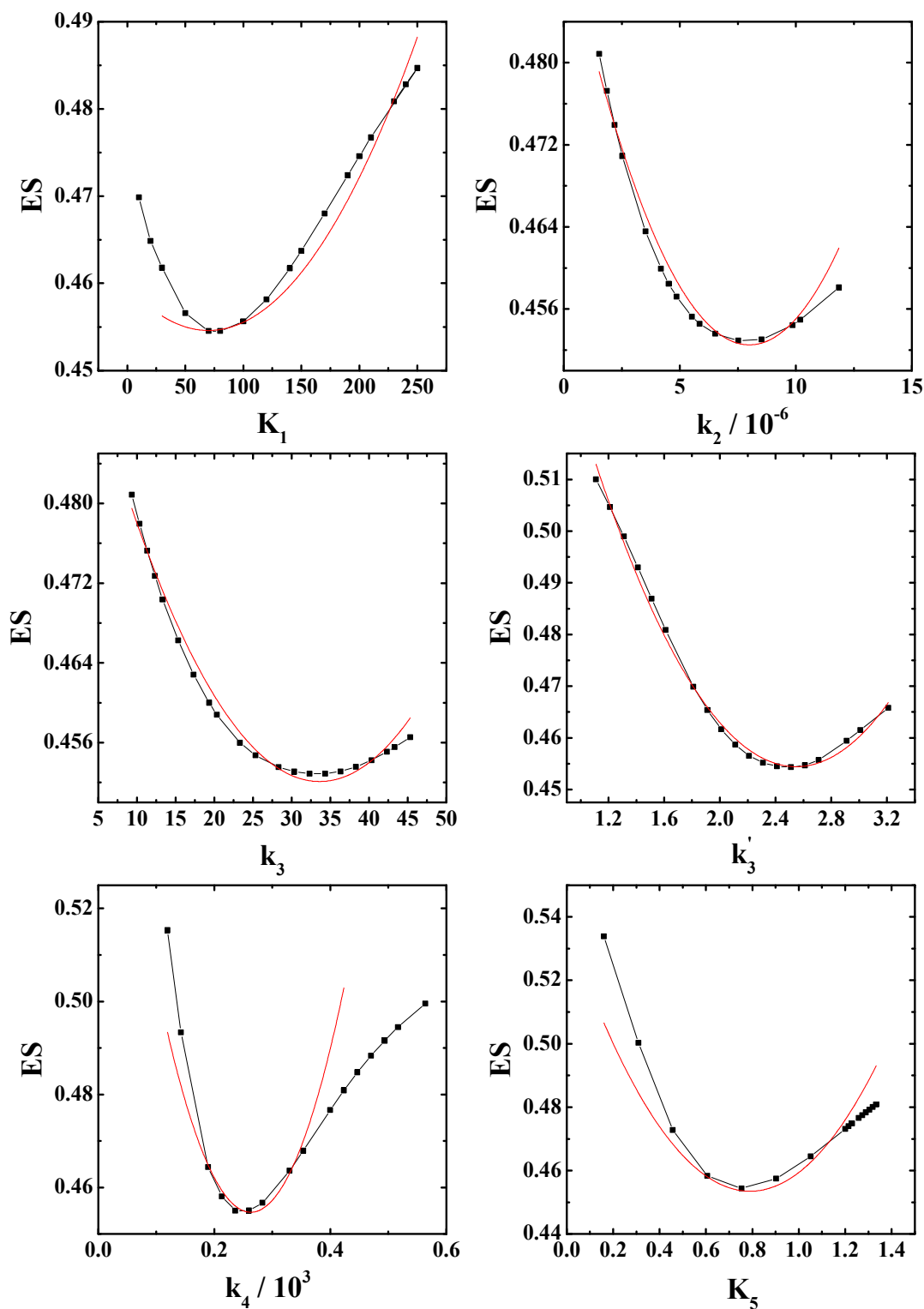


Figure S1: ES values as a function of each rate constant variation at 2.34 V. In red is shown the parabolic adjustment for error determination.

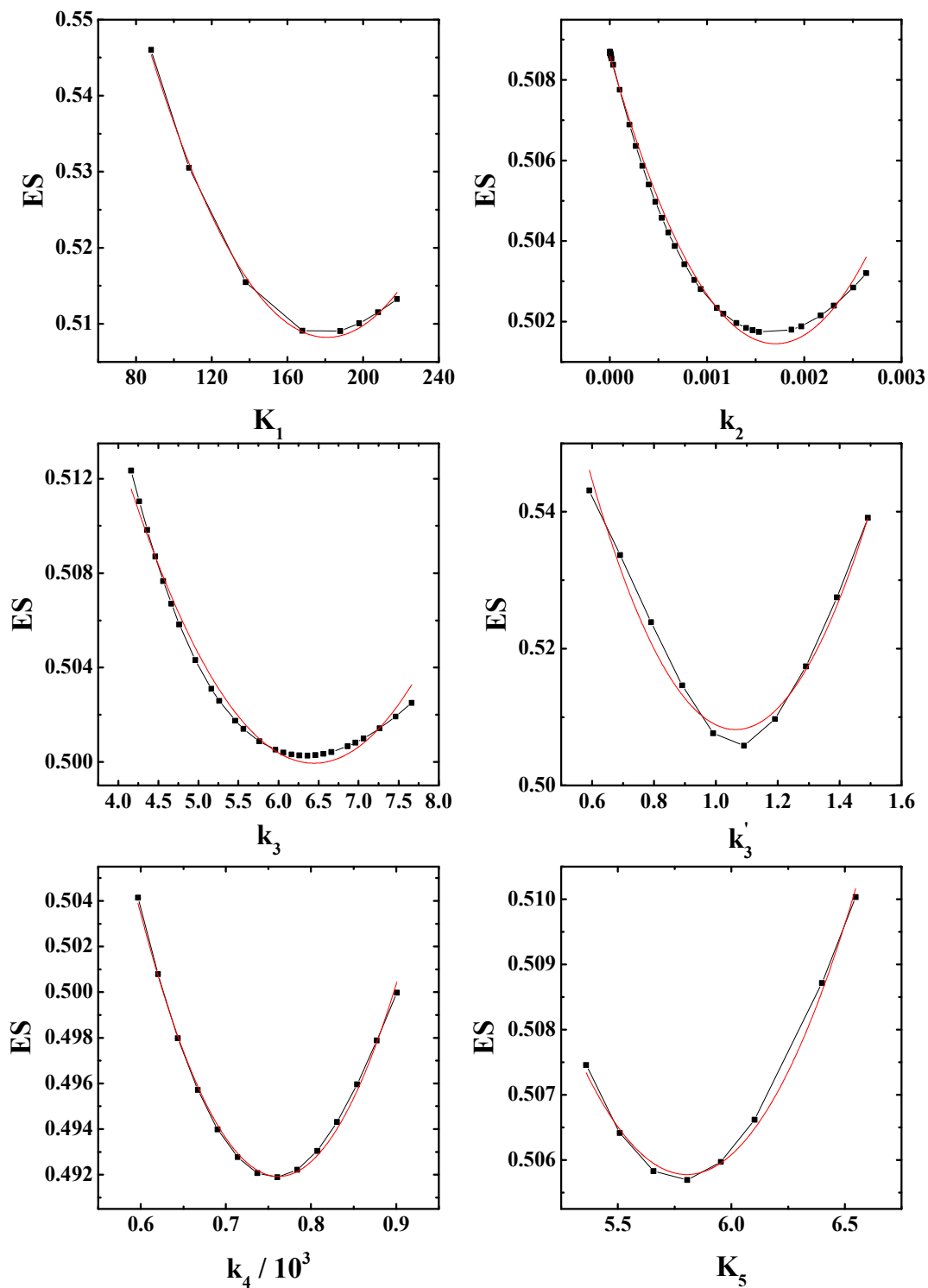


Figure S2: ES values as a function of rate constant variation at 2.10 V. Red curves corresponds the parabolic adjustment for error determination.

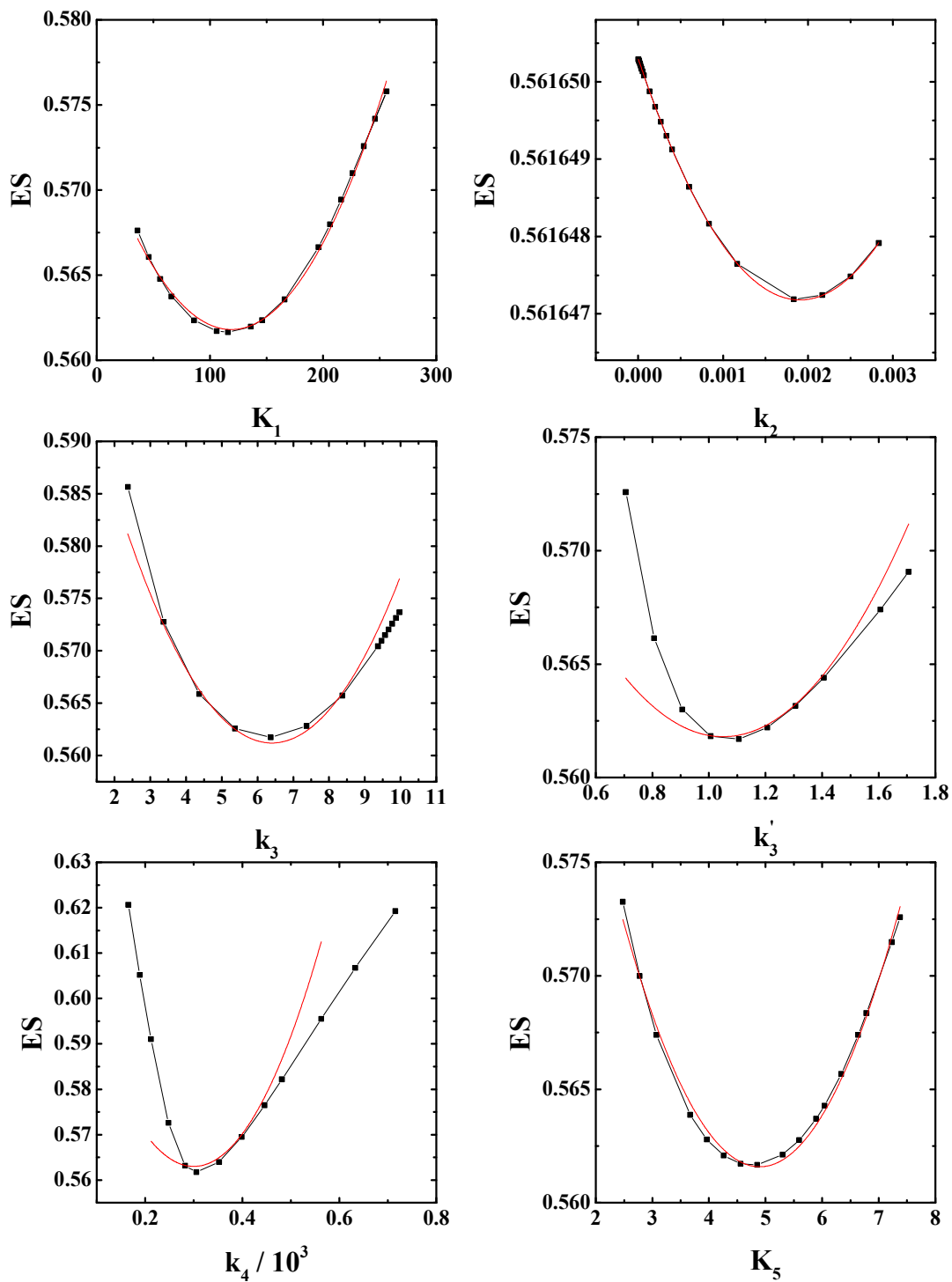


Figure S3: ES values as a function of the rate constant variation at 1.90 V. Red curves corresponds to the parabolic adjustment for error determination.