Pd/C electrocatalyst has the EOR governed by two determining steps since it showed two straight lines between 570 mV and 730 mV, presenting also two different slopes (a and b, in Figure 1). Unlike the other electrocatalysts, with Nb in their chemical composition, that the EOR occurs by one determining step since there is just one slope. The exchange current densities (A cm$^{-2}$) were 2.3x10$^{-17}$, 2.7x10$^{-12}$, 6.6x10$^{-10}$, 3.6x10$^{-11}$ and 7.3x10$^{-11}$ for Pd/C, Pd/Cb, Pd1Nb1/C, Pd3Nb1/C and Pd1Nb3/C, respectively. This shows that Nb increases the electron exchange rate at the analyte/electrode interface, improving the kinetics of the EOR reaction [3]. FTIR experiments strengthened the evidence that Nb modifies the Pd mechanism for EOR electrocatalysis to a mechanism that present almost no formation of acetaldehyde, avoiding the reaction $\text{C}_{2}\text{H}_4\text{OH}_{\text{ads}} + 2 \text{H}^+_{\text{ads}} \rightarrow \text{CH}_3\text{CHO}_{\text{ads}} + 2 \text{H}_2\text{O} + 2e^-$. The FTIR spectra showed that Pd1Nb/C displays the highest production of CO$_2$ and the lowest production of acetaldehyde. Furthermore, the ADT experiments with ICP-MS analysis indicated that Pd1Nb/C obtained the highest peak current density during 1000 cycles of the experiment, presenting the lowest Pd mass loss after the ADT.

Acknowledgements:
The authors are grateful to Fapesp (2015/10314-8, 2016/00819-8, 2017/21846-6), CNPq (406612/2013-7) and Capes for the scholarship. The authors are grateful to the CEM-UFABC for the experimental support.

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