

Supporting Information (SI):

**Does the platinum-loading in proton-exchange membrane fuel cell
cathodes influence the durability of the membrane-electrode
assembly?**

Ricardo Sgarbi^{1a}, William Ait Idir^{2a}, Quentin Labarde¹, Michel Mermoux¹, Peizhe Wu², Julia
Mainka², Jérôme Dillet², Clémence Marty³, Fabrice Micoud³, Olivier Lottin², Marian
Chatenet^{1*}

¹*Univ. Grenoble Alpes, Univ. Savoie Mont Blanc, CNRS, Grenoble INP (Institute of
Engineering and Management Univ. Grenoble Alpes), LEPMI, 38000 Grenoble, France*

²*LEMTA - Université de Lorraine - CNRS, Nancy, France*

³*Univ. Grenoble Alpes, CEA, LITEN, F-38054, Grenoble, France*

* Corresponding author. E-mail address: marian.chatenet@grenoble-inp.fr

^a: the authors equally contributed to the work

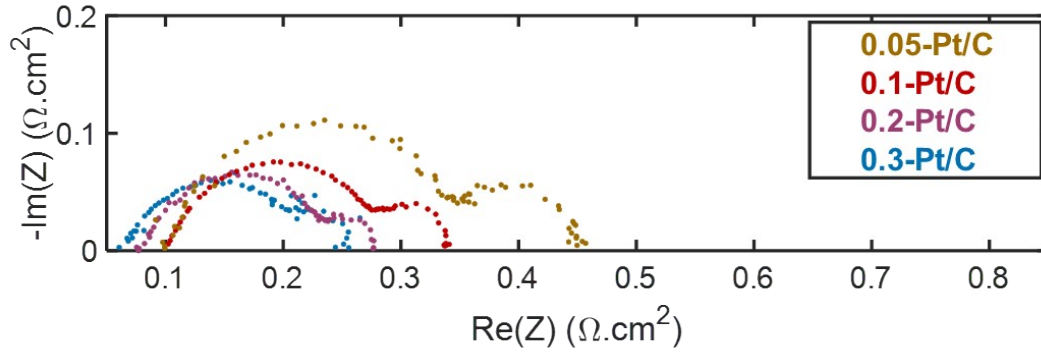


Fig. S1 EIS diagrams recorded at BOT for the four x -Pt/C MEAs at 1 A cm⁻².

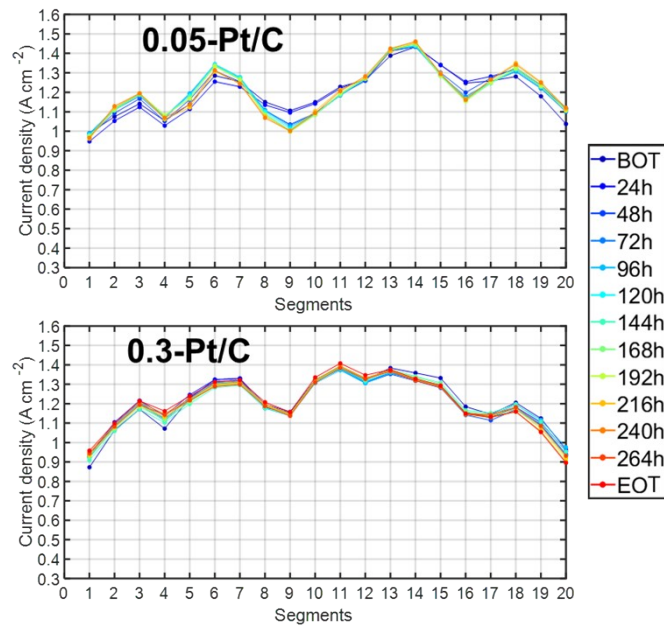


Fig. S2 Local current density along the gas channel measured at overall 1 A cm⁻² in a segmented cell for CLs 0.05-Pt/C and 0.3-Pt/C. Segment #1 corresponds to the air inlet at the cathode and H₂ outlet at the anode, while segment #20 corresponds to the air outlet at the cathode and H₂ inlet at the anode.

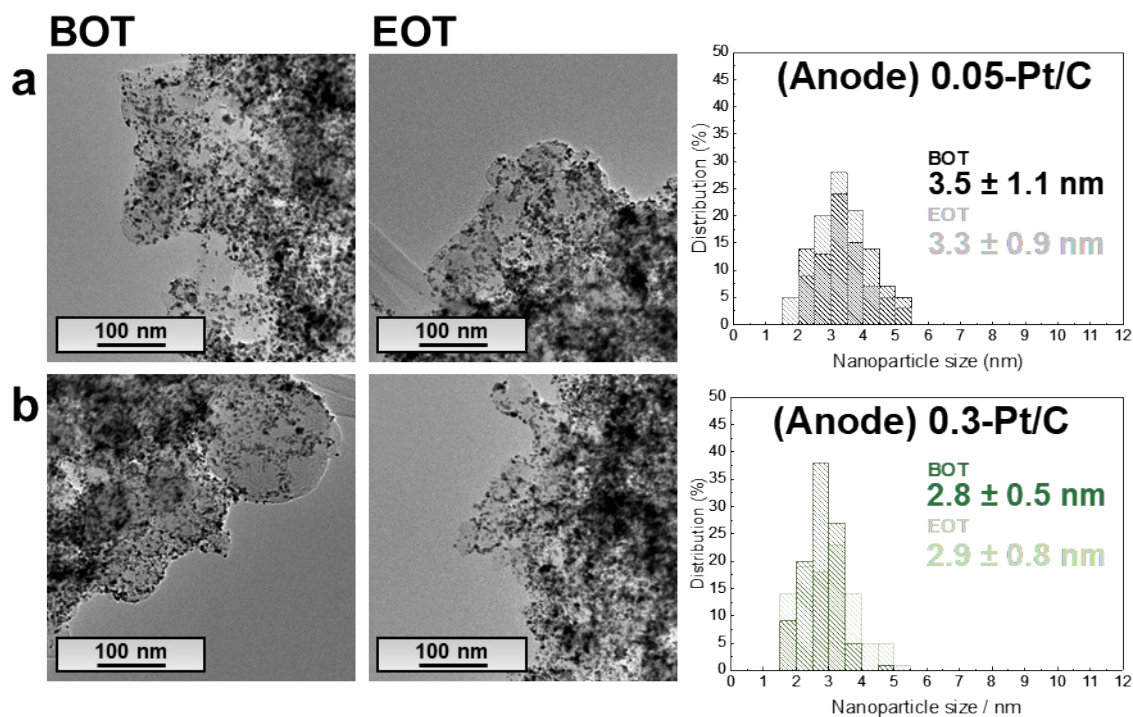


Fig. S3 Representative TEM images, corresponding nanoparticle size distribution histograms and mean nanoparticles diameter values for the active materials scrapped from anode CLs at Beginning of Test (BOT) and End of Test (EOT): **(a)** 0.05-Pt/C and **(b)** 0.3-Pt/C.

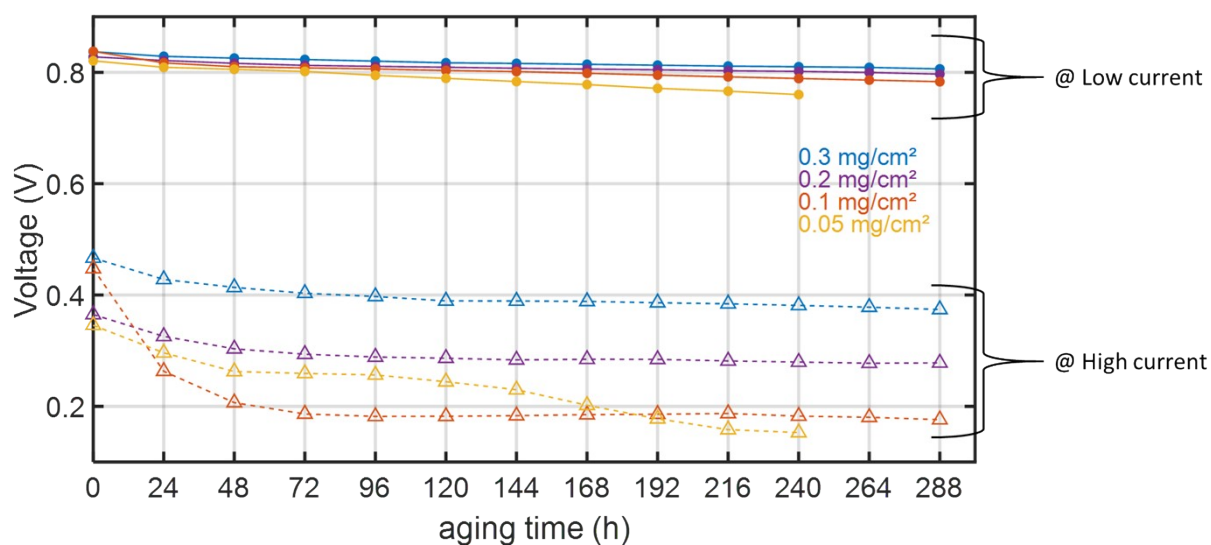


Fig. S4 Cell voltages during their daily characterization step divided on low and high current regions for 0.05-Pt/C, 0.1-Pt/C, 0.2-Pt/C and 0.3-Pt/C cathode CLs.

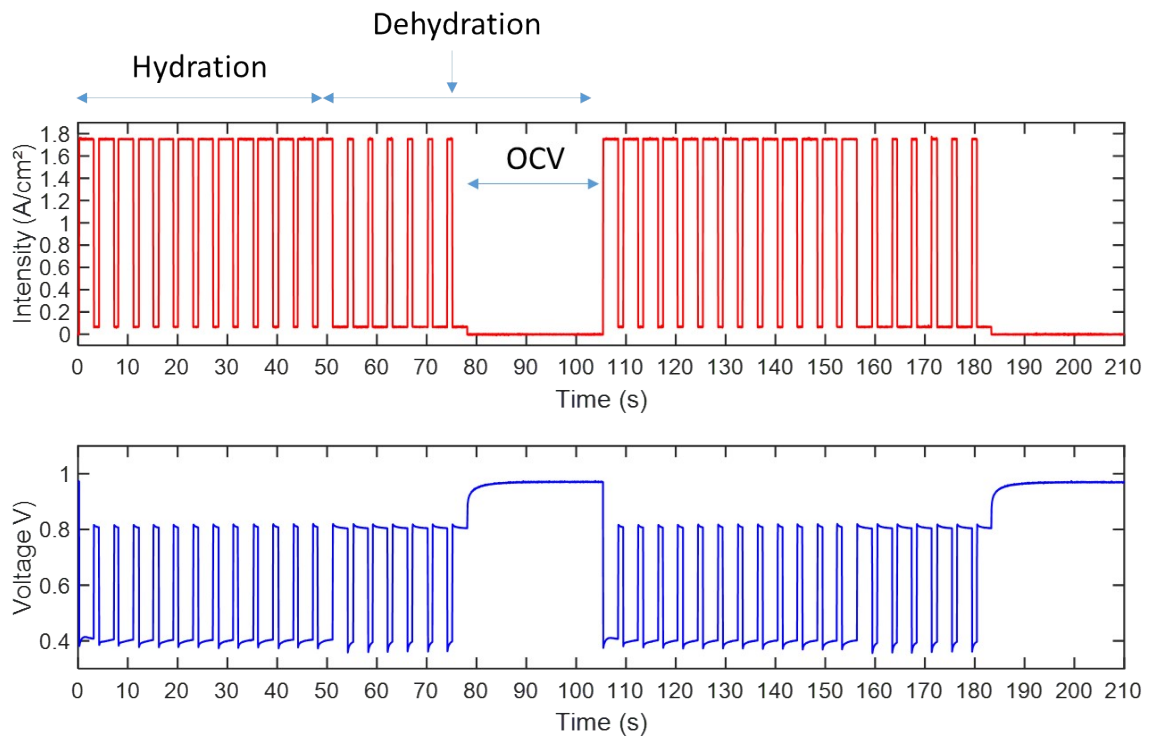
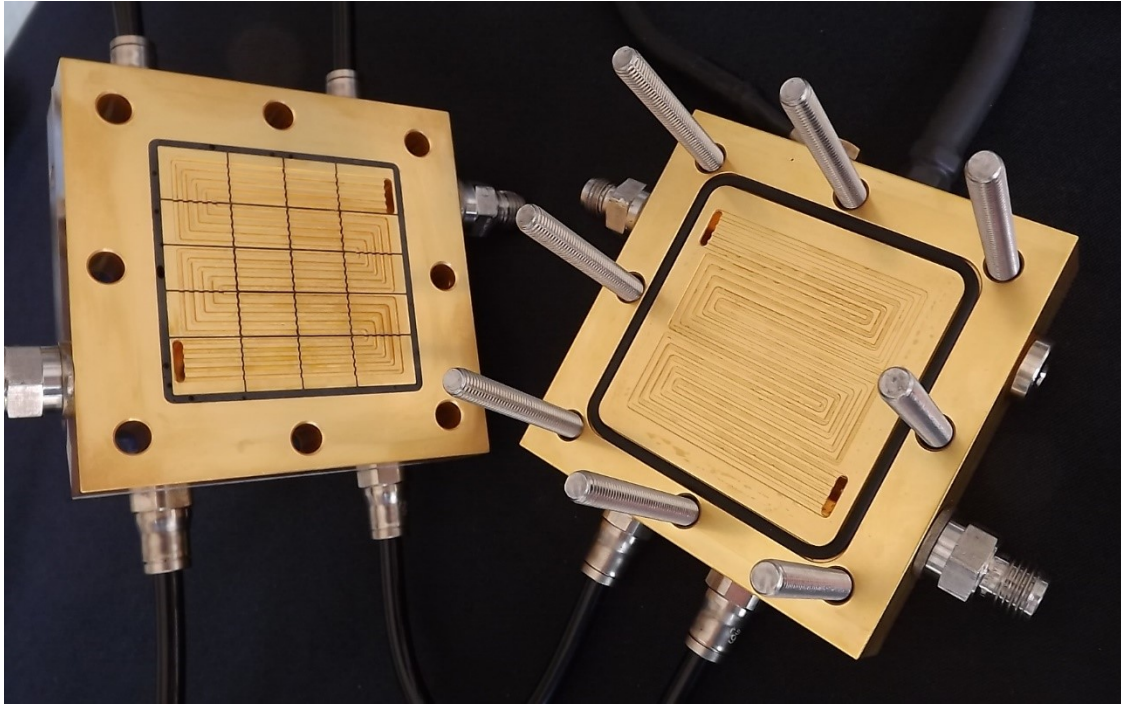


Fig. S5 Photograph of the $5 \times 5 = 25 \text{ cm}^2$ segmented PEMFC illustrating the flow fields pattern.

Fig. S6 Accelerated Stress Test (AST) - 105 s sequence combining load cycling + humidity cycling + OCV. Dehydration occurs when the duration of the high current sequence is reduced

from 3 s to 1 s (while that of the low current sequences is increased from 1 s to 3 s) and during OCV. The gas flow rates are maintained constant during the whole of the AST, as well as their RH (50%).