Supplementary Information for

Proton-Donating and Chemistry-Dependent Buffering Capability of Amino Acids for the Hydrogen Evolution Reaction

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Koutecky-Levich equation

Values for the physical constants were obtained from [1,2] where:

n = 2 (number of protons exchanged)

D_{H^+} = 8 x 10^{-5} cm^2 s^{-1} (diffusion coefficient for proton in water)

F = 96 485 C mol^{-1} (Faraday constant)

ω = 2000 rpm (rotation speed)

ν = 8.9 x 10^{-3} cm^2 s^{-1} (kinematic viscosity)

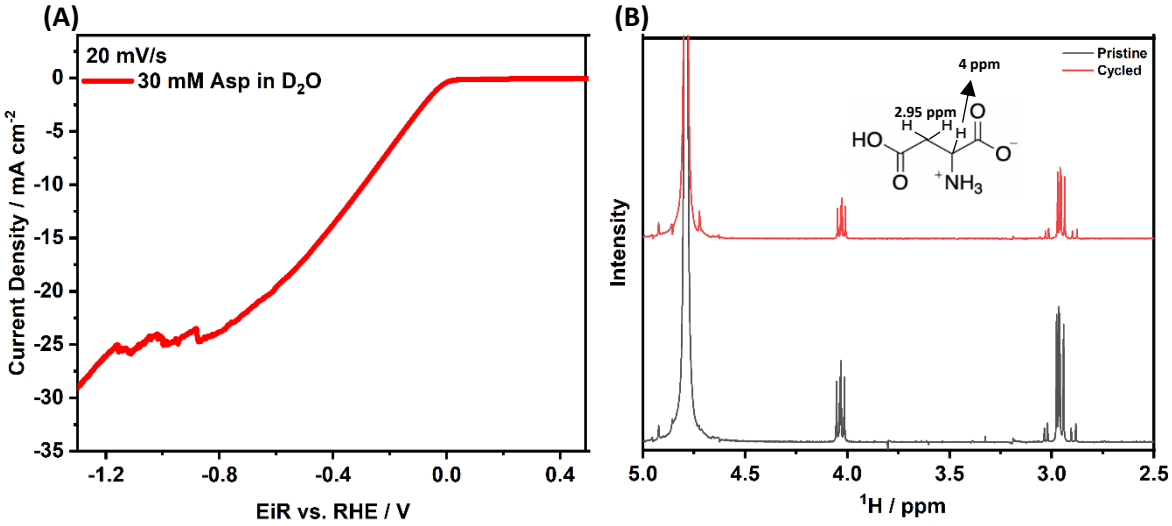

Figure S1. (A) Cyclic voltammograms measurement for 30 mM Aspartic Acid in D_2O with 100 mM Li_2SO_4 supporting salt recorded at 20 mV/s on polycrystalline Pt rotating disk electrode (rotation speed of 2000 RPM), **(B)** NMR data for pristine and cycled measurement for 30 mM Aspartic Acid in D_2O with 100 mM Li_2SO_4 supporting salt: δH(300 MHz; D_2O) 2.95 (2 H, m) and 4.05 (1 H, dd), 4.75 (s, H_2O).

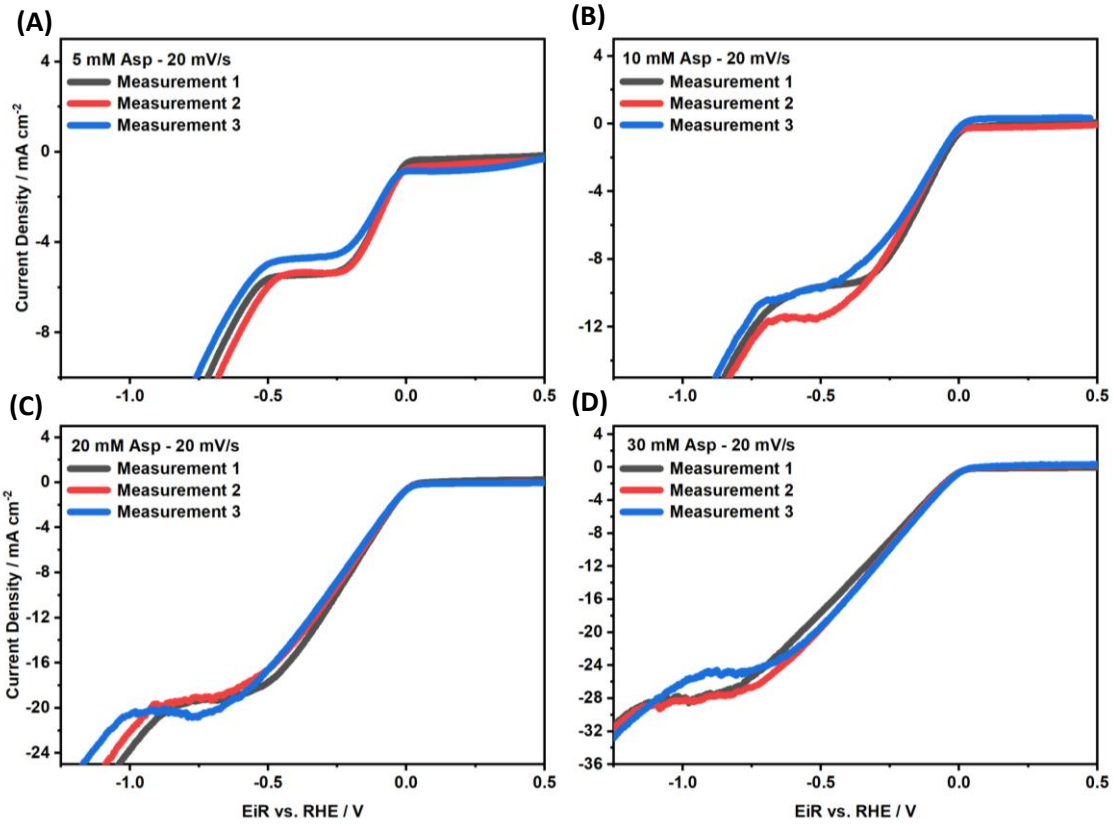

Figure S2. Three separate cyclic voltammograms measurements for (A) 5 mM Aspartic Acid (Asp), (B) 10 mM Asp, (C) 20 mM Asp & (D) 30 mM Asp with 100 mM Li_2SO_4 supporting salt recorded at 20 mV/s on polycrystalline Pt rotating disk electrode (rotation speed of 2000 RPM).

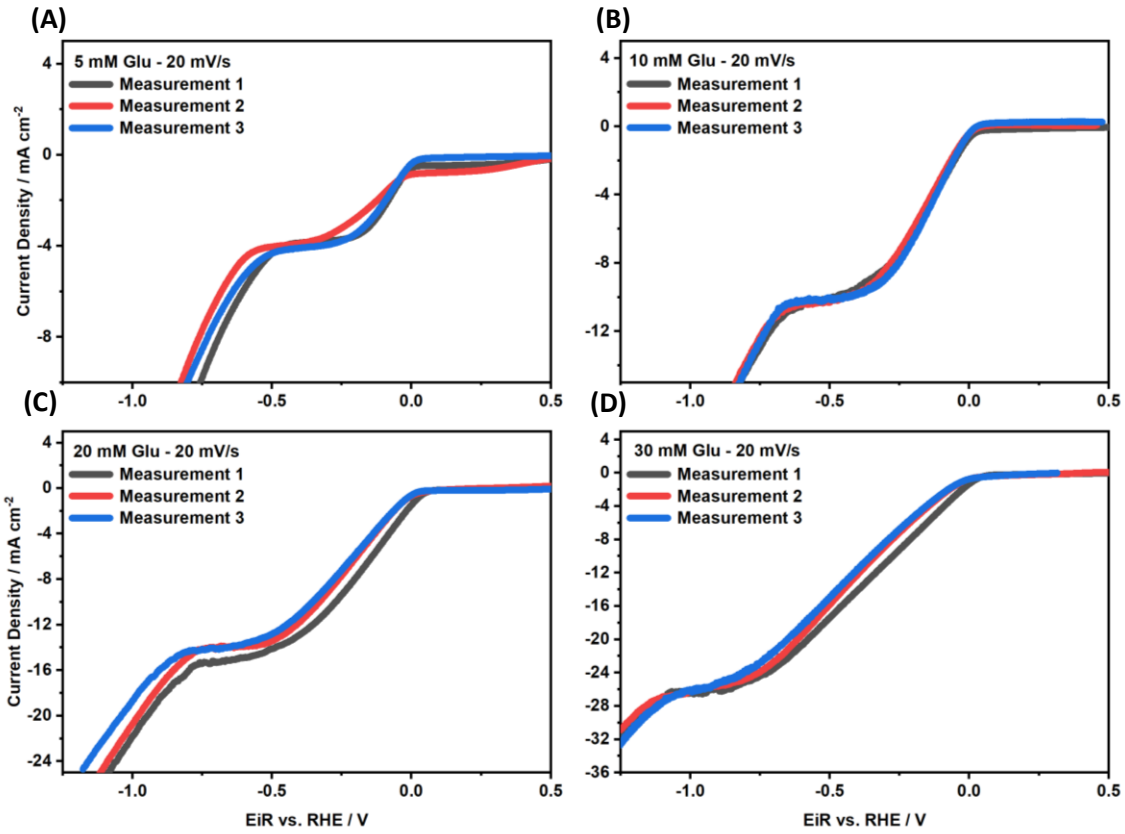

Figure S3. Three separate cyclic voltammograms measurements for (A) 5 mM Glutamic Acid (Glu), (B) 10 mM Glu, (C) 20 mM Glu & (D) 30 mM Glu with 100 mM Li_2SO_4 supporting salt recorded at 20 mV/s on polycrystalline Pt rotating disk electrode (rotation speed of 2000 RPM).

References

(1) D. Strmcnik, M. Uchimura, C. Wang, R. Subbaraman, N. Danilovic, D. van der Vliet, A. P. Paulikas, V. R. Stamenkovic and N. M. Markovic, *Nat. Chem.*, 2013, **5**, 300

(2) N. Dubouis, C. Yang, R. Beer, L. Ries, D. Voiry and A. Grimaud, *ACS Catalysis*, 2018, **8**, 828