Electronic Supplementary Material (ESI) for New Journal of Chemistry.

Supporting Information:

Highly Efficient Metal-free Ethylene Diamine Functionalized Fullerene (EDA@C_{60}) Electrocatalytic system for Enhanced Hydrogen Generation from Hydrazine Hydrate.

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EIS Studies of EDA@C60:

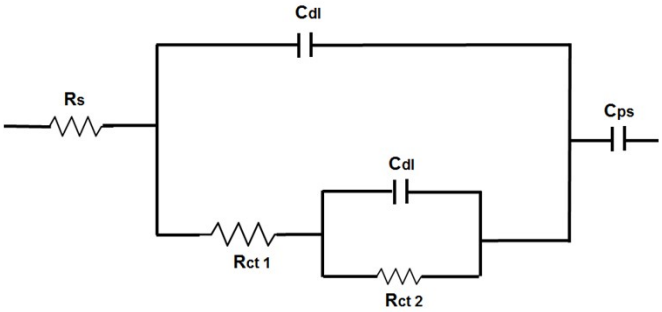

Figure S1: Equivalent circuit of EDA@C_{60} for HER 0.5 M KOH solution consisting of a solution resistance (Rs), a charge-transfer resistance (R_{ct}) and a pseudo capacitive element (C_p).

Table S1: Evaluation summary of Hydrogen Evolution Reaction belongs to state-of-the-art electrocatalysts reported in kinds of literature survey and present work.

Sr. No.	Material	Medium	scan rate (mV s^{-1})	onset potential (vs RHE)	Reference
1	bilateral graphite	$HClO_4$	500	0.80	1
2	MnO_2–Fe_2O_3/CFs	PBS	50	0.90	2
3	N-doped carbon	PBS	50	0.76	3
4	Fe_2O_3/CP-epoxy	PBS	100	1.03	4
5	Hist@rGO	KOH	50	0.75	5
6	EDA@C60	KOH	50	0.72	This work

References:

1) S. P. E, Y. R. Kim, D. Perry, C. L. Bentley, P. R. Unwin, *ACS Appl. Mater. Interface,* 2016, **8**, 30458−30466.

2) C. Li, M. Li, X. Bo, L. Yang, A. C. Mtukula, L. Guo, *Electrochim. Acta*, 2016, **211**, 255−264.

3) L. Yan, X. Bo, Y. Zhang, L. Guo, *Electrochem. Acta,* 2014, **137**, 693−699.

4) B. Sljukic, C. E. Banks, A. Crossley, R. G. Compton, *Electroanalysis,* 2006, **18**, 1757−1762.

5) P. P. Chavan, V. S. Sapner, B. R. Sathe, *Energy Fuels*, 2022, **36**, 4799−4806.