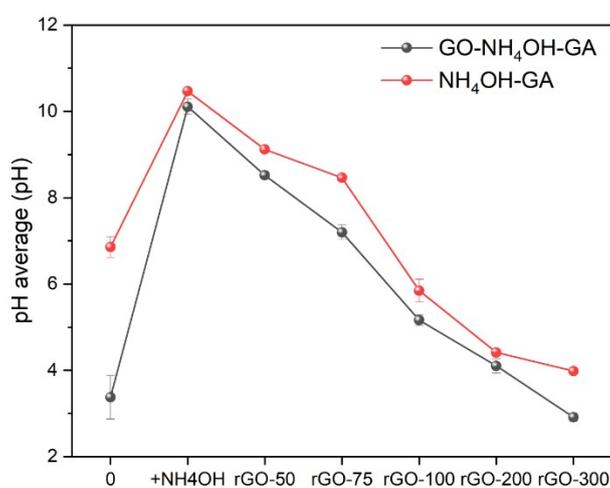


## Supplementary Information

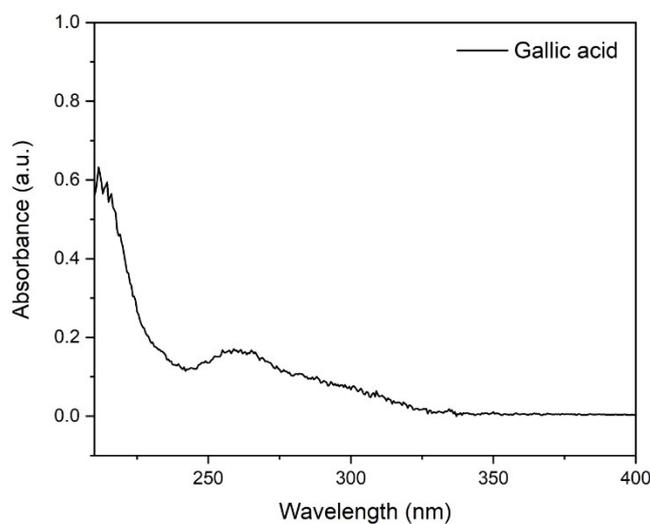
### Concentration-Dependent Kinetic Study of Graphene Oxide (GO) Reduction Using Biophenol and Electrochemical Analysis

Saad Zafar<sup>†</sup>, Sanjana Krishna Mani<sup>†</sup>, Monisha Monisha, Bimlesh Lochab\*

Materials Chemistry Laboratory, Department of Chemistry, School of Natural Sciences, Shiv Nadar Institution of Eminence, Gautam Buddha Nagar, Uttar Pradesh, 201314, India



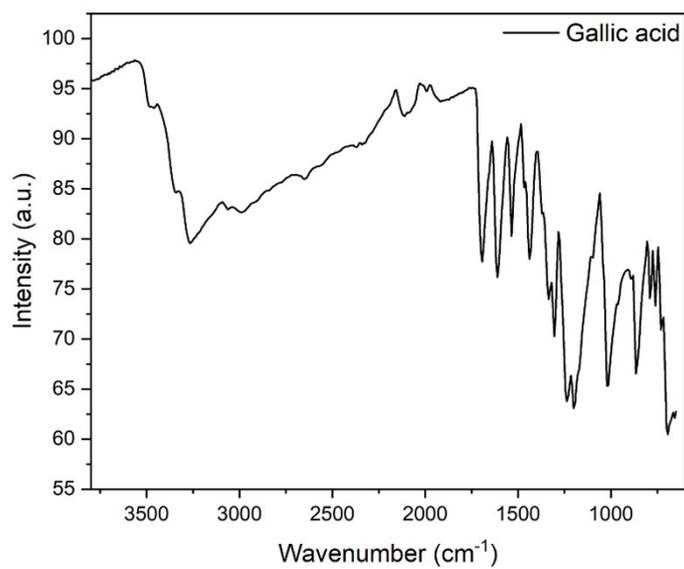
**Figure S1.** pH variation of the GO and NH<sub>4</sub>OH solution with the sequential addition of gallic acid to obtain rGO<sub>50</sub> to rGO<sub>300</sub>.



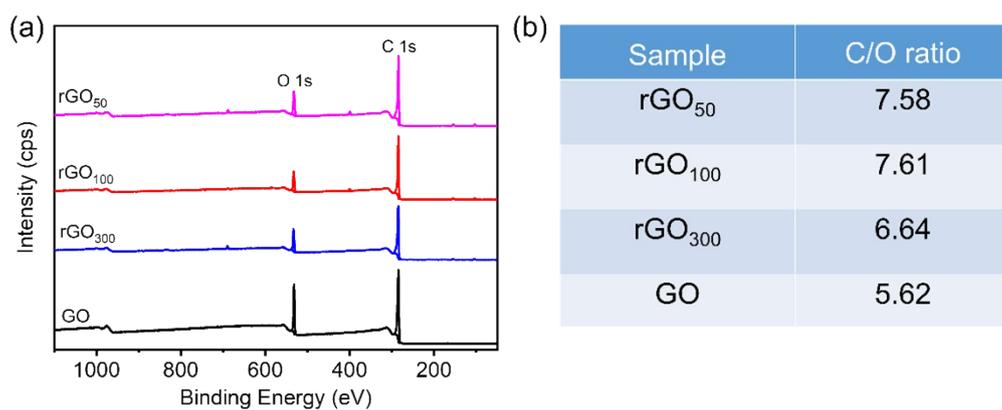
**Figure S2.** UV-vis. plot of gallic acid.

**Table S1.** Variation of slope in plot within the initial first hour of the reduction reaction.

Ratio	Slope (nm/h)
rGO <sub>50</sub>	19.25
rGO <sub>75</sub>	28.39
rGO <sub>100</sub>	21.65
rGO <sub>200</sub>	12.21
rGO <sub>300</sub>	8.571



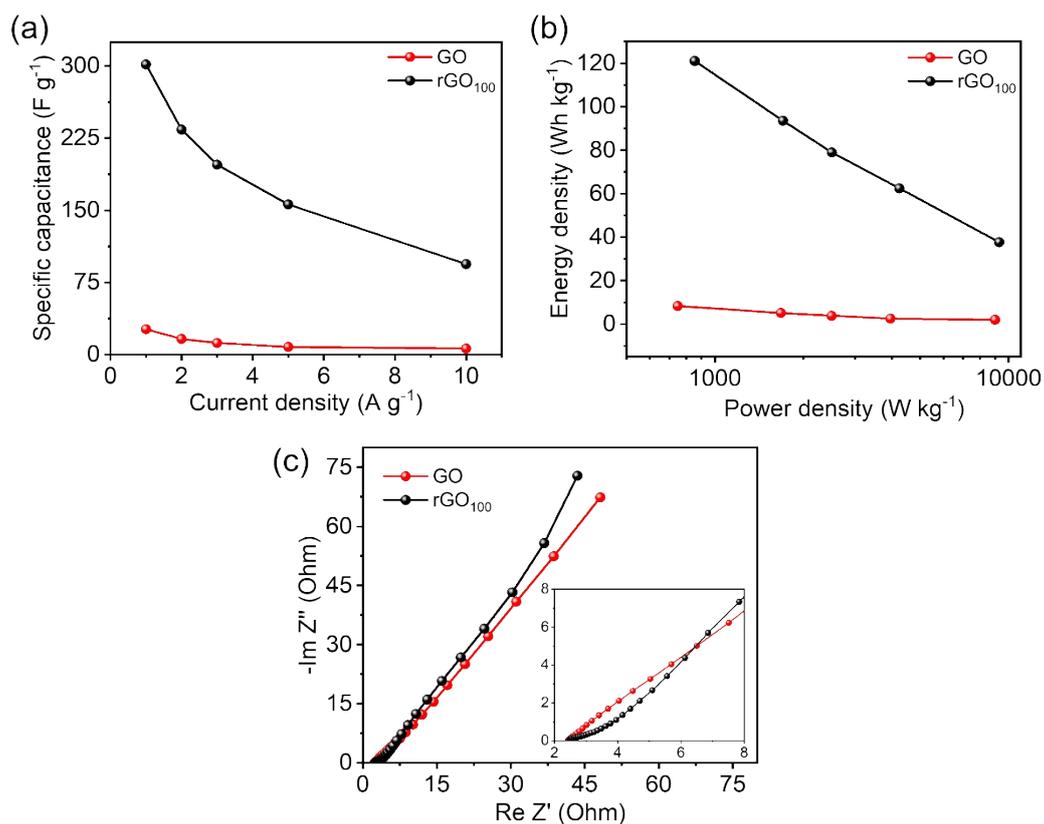
**Figure S3.** FT-IR spectra of gallic acid.



**Figure S4.** (a) XPS wide survey spectra of GO, and reduced GOs, and (b) carbon to oxygen ratio evaluated from atomic weight percentage in XPS wide spectra.

**Table S2.** Comparative specific capacitance values reported for rGO obtained using different sustainable reducing agents.

Sample	Reducing agent	Capacity (F g <sup>-1</sup> )	Current density (A g <sup>-1</sup> )
rGO <sup>1</sup>	Urea	255	0.5
rGO <sup>2</sup>	Caffeic acid	136	1.0
rGO <sup>3</sup>	Ascorbic acid	48.3	0.1
rGO (our work)	Gallic acid	301.7	1.0



**Figure S5.** (a) Plot depicting specific capacitance against current density, (b) Ragone plot, and (c) EIS spectra of GO and rGO<sub>100</sub> (inset shows magnified EIS spectra).

### Reference:

1. Z. Lei, L. Lu and X. S. Zhao, *Energy Environ. Sci.*, 2012, **5**, 6391-6399.
2. Z. Bo, X. Shuai, S. Mao, H. Yang, J. Qian, J. Chen, J. Yan and K. Cen, *Sci. Rep.*, 2014, **4**, 4684.
3. S. Rai, R. Bhujel, M. Khadka, R. L. Chetry, B. P. Swain and J. Biswas, *Mater. Today Chem.*, 2021, **20**, 100472.