# Electronic Supplementary Information

# Waste Coffee Management: Deriving High-Performance Supercapacitors using Nitrogen-Doped Coffee Derived Carbon

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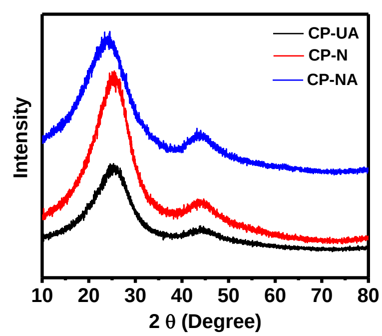


**Fig. S1:** XRD patterns of carbonized coffee powders.

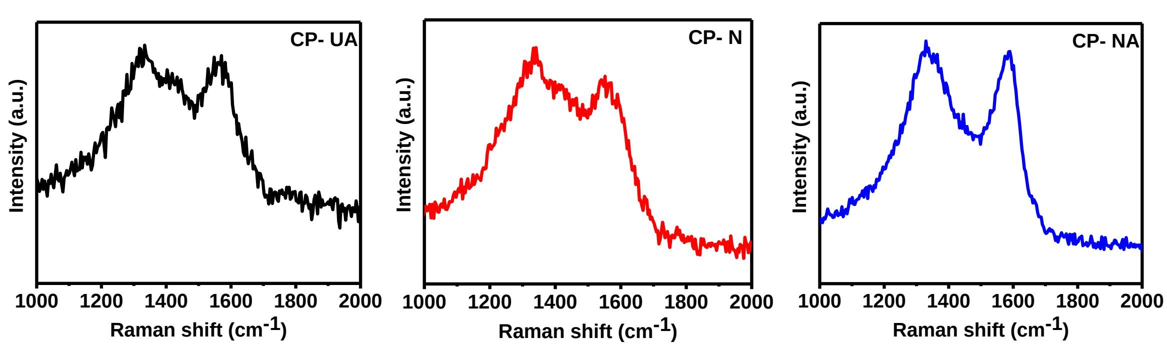


**Fig. S2:** Raman spectra of the carbonized coffee powders (CP-UA, CP-N, and CP-NA).

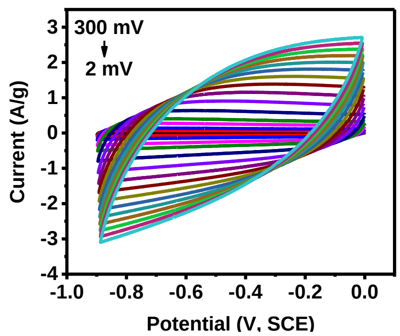


**Fig. S3:** (**a)** CV curves of CP-NA at various scan rates.

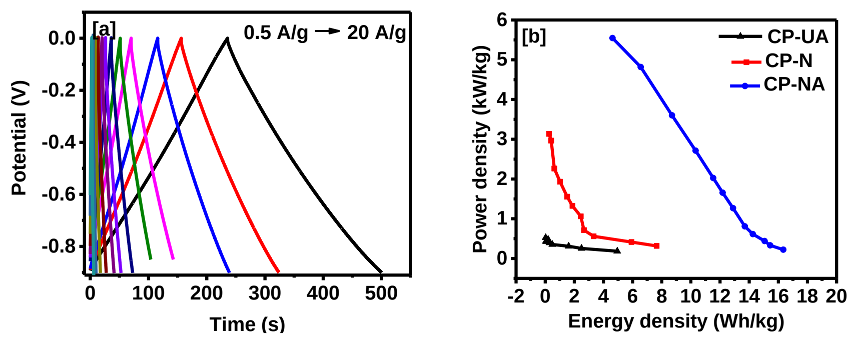


**Fig. S4: (a)** Charge-discharge characteristics of CP-NA at various current densities, and **b)** Ragone plot for all the samples.

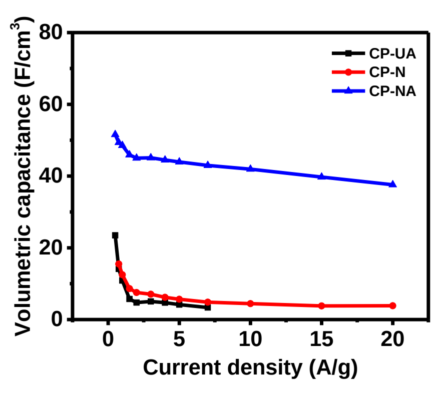


**Fig. S5:** Volumetric capacitance versus applied current for all the samples.

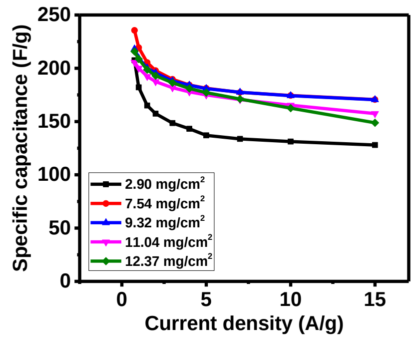


**Fig. S6:** Variation of specific capacitance as a function of mass loading and current desnity.

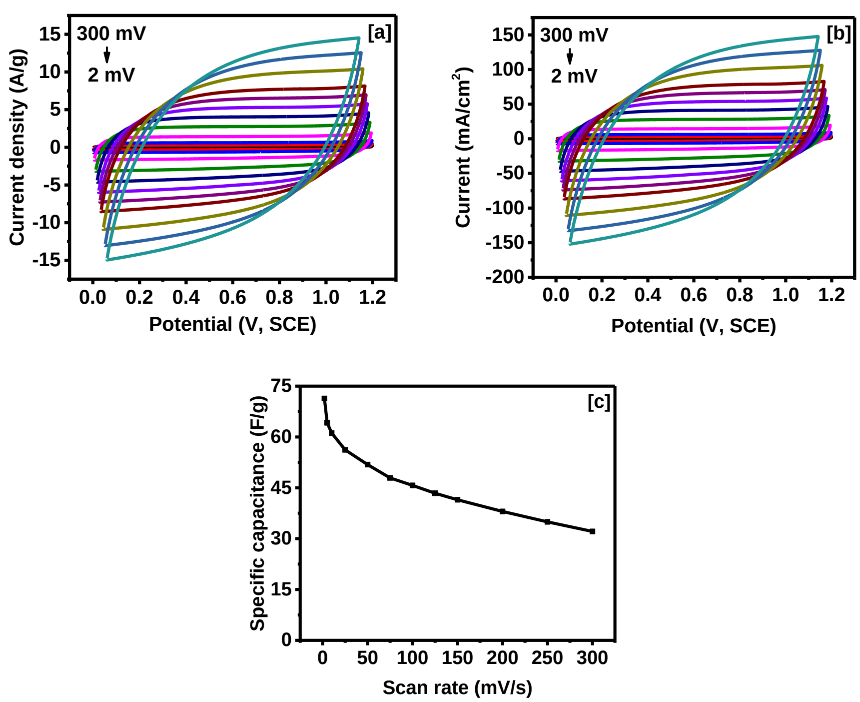


**Fig. S7:** CV curves of CP-NA at various scan rates based on **(a)** weight and **(b)** area, and **(c)** variation of specific capacitance versus scan rate.

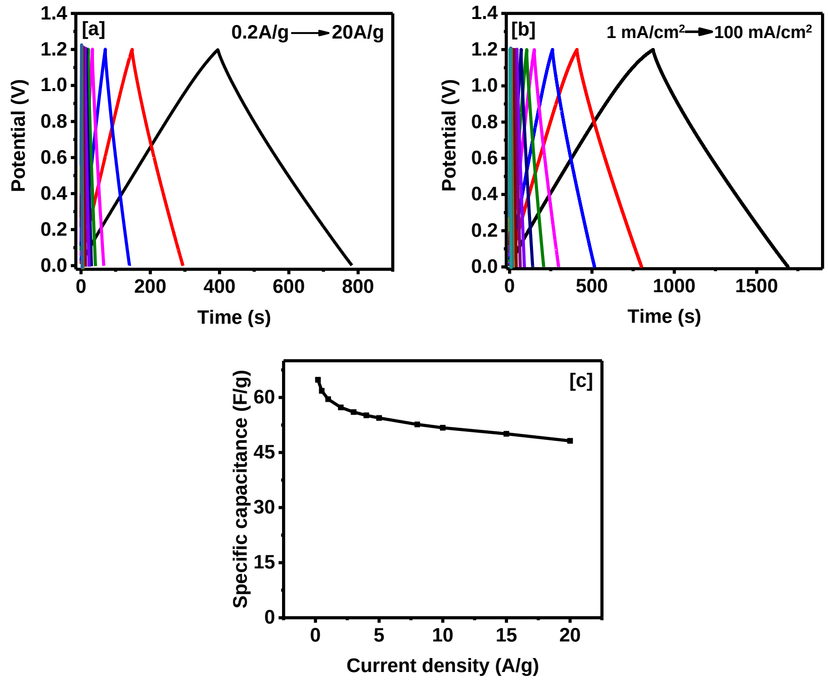


**Fig. S8:** Galvanostatic charge-discharge curves of CP-NA at various current densities based on (a) weight and (b) area, and (c) variation of specific capacitance versus applied current.

**Table S1**: Atomic content of coffee derived carbons.

| Sample | Content (%) | | | Content of N Species (%) | | | |
|---|---|---|---|---|---|---|---|
| | C (%) | N (%) | O (%) | Pyridinic | Pyrrolic | Graphitic | Oxidized |
| CP-UA | 72.07 | 1.73 | 26.2 | 0.55 | 0.47 | 0.42 | 0.29 |
| CP-N | 77.37 | 10.18 | 12.45 | 3.82 | 2.13 | 3.87 | 0.36 |
| CP-NA | 86.05 | 2.80 | 11.15 | 0.52 | 1.62 | 0.11 | 0.55 |

**Table S2**: Comparison of Energy and power density with previous carbon-based supercapacitor devices.

| Device | Energy density (Wh/kg) | Power density (W/kg) | Reference |
|---|---|---|---|
| **Waste Coffee derived carbon** | **12.8** | **6,643** | **This work** |
| Cherry stone derived carbon | 5 | ~2,000 | [1] |
| Sisal leaves carbon | ~11.5 | ~11,000 | [2] |
| Lignin derived nanoporous carbon | 12.8 | ~10,500 | [3] |
| Bio-oil derived hierarchical porous carbon | 8.1 | 4,702 | [4] |
| Coal tar pitch carbon | 6 | ~2,500 | [4] |
| Carbon from sugarcane bagasse | 7 | 3,600 | [5] |
| Fruit stone carbon | ~11 | ~3,100 | [6] |
| Commercial microporous carbon Norit | 5 | ~3,000 | [6] |
| Sago bark derived carbon | 5 | 400 | [6] |

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