Electronic Supplementary Information

Generation of radical species in CVD grown pristine and N-doped solid carbon spheres using H_2 and Ar as carrier gases

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Surface area analysis

The N_2 adsorption and desorption isotherms of the solid carbon spheres were taken at 77K using a Micromeritics Tristar 3000 instrument. About 0.2 g of each sample was degassed at 250 ºC in N_2 for 4 h. The specific surface area was calculated by the BET method from the N_2 adsorption data.

Fourier Transform infrared spectra analysis

The FTIR spectra of the post N-doped CSs are presented in Fig. S2. For all the spheres, small peaks due to C-H bending and C-C modes[1] were observed between 835 cm^{-1} and 1110 cm^{-1} while the C-H stretching modes were observed between 2700 cm^{-1} to 3000 cm^{-1}, as well as the C=C bonds observed at (1450 cm^{-1}- 1580 cm^{-1})[1] and CO_2 modes observed at (2200 cm^{-1} - 2500 cm^{-1})[1]. Nitrogen incorporation in the CSs was confirmed by the appearance of C-N (at 1242 cm^{-1} and 1238 cm^{-1}), C=N (2050 cm^{-1} - 2120 cm^{-1})[2] stretching modes and N-H bending modes (1561 cm^{-1} - 1580 cm^{-1}) in both the NCSs-Ar and NCSs-H_2 spheres.

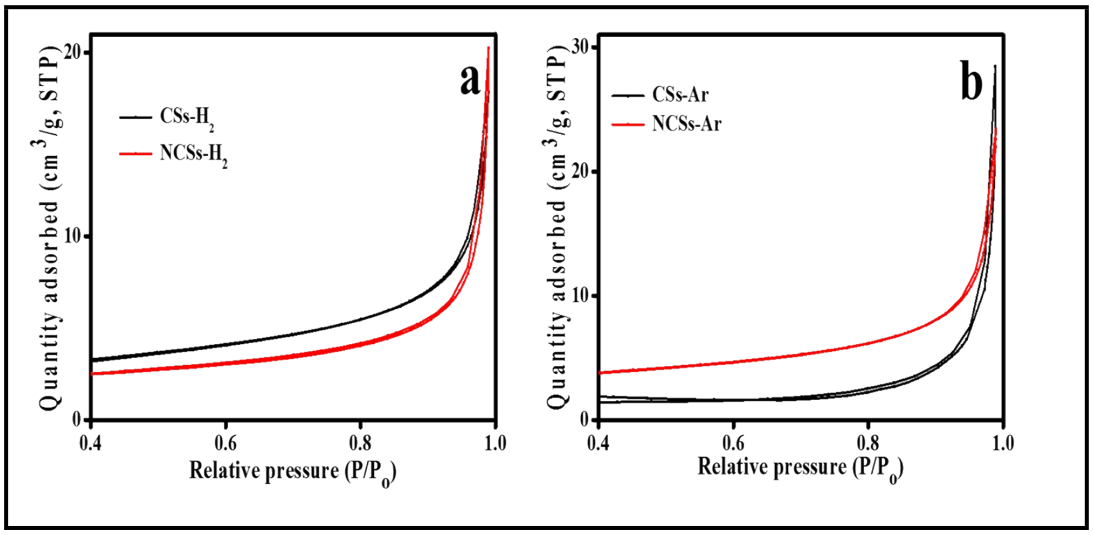

Figure S1. The N_2- adsorption and desorption isotherms of pristine and post N-doped CSs; (a) synthesized in H_2 and (b) synthesized in Ar, respectively.

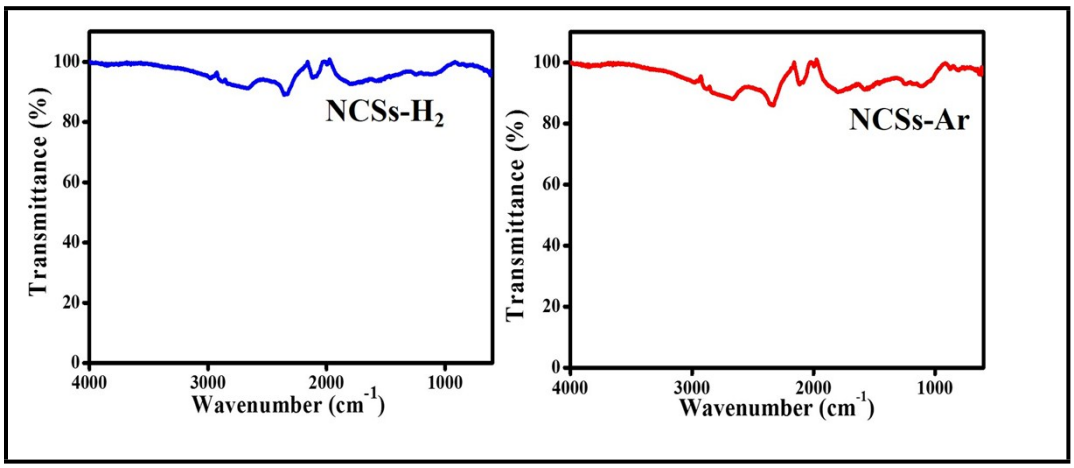

Figure S2. The FTIR spectra of the NCSs-H_2 and NCSs-Ar spheres.

Table S1. TGA results for the pristine and N-doped CSs

Material	Decomposition temperature (ºC)
CSs-H_2	717
NCSs-H_2	453, 560, 593
CSs-Ar	640
NCSs-Ar	460, 635

Table S2. Effect of carrier gas and post N-doping on the surface areas and ESR line width (peak to peak distance) of the CSs

Material	BET surface area (m^2/g)	ESR Line width (G)
CSs-H_2	9.2 ± 0.1	0.54 ± 0.01
NCSs-H_2	7.2 ± 0.2	0.78 ± 0.01
CSs-Ar	6.3 ± 0.4	1.83 ± 0.01
NCSs-Ar	10.5 ± 0.1	0.61 ± 0.01

References

1. G. Socrates, *Infrared and Raman characteristic group frequencies: tables and charts*, John Wiley & Sons, 2004.
2. S. Silva, J. Robertson, G. Amaratunga, B. Rafferty, L. Brown, J. Schwan, D. Franceschini and G. Mariotto, *Journal of applied physics*, 1997, **81**, 2626-2634.