

Supplementary Information

Gas Chromatography Mass Spectrometry (GC-MS)

Analyses of 16 EPA PAHs, designed by USEPA as priority pollutants, were performed by GC-MS. A fused-silica capillary column HP-5MS ultra inert (30 m x 0.25 mm x 0.25 µm) was used as stationary phase and helium was employed as the carrier gas at a flow rate of 1 ml/min. The GC injector was operated in a pulsed splitless mode at 300 °C. The initial oven temperature at 80 °C was held for 3 min, ramped at 10 °C/min to 120 °C (held for 3 min), and then raised up to 295 °C at 6 °C/min (held for 15 min). The mass spectrometer was operated in selected ion monitoring mode (SIM). Identification of PAHs was based on selected ions and relative retention time between samples and standard solutions containing individual PAHs. Quantification was carried out by the internal calibration method using the deuterated internal standards (Acenaphthene-d10, Phenanthrene-d10, Perylene-d12). The control of quality of the analysis was assured by using blanks and a certified reference soil sample (CRM170, Sigma-Aldrich). In addition, a surrogate (Pyrene-d10) was spiked to all soil samples before extraction, obtaining recoveries in the range of 80-115%. PAH standards were supplied by Sigma-Aldrich and their corresponding deuterated from Dr. Ehrenstorfer. All solvents and chemicals were of HPLC grade or better. The limit of quantification (LOQ) ranged from 0.1 to 0.2 µg/kg for HAPs.

Table S1. Accuracy and precision obtained for Hg and As analysis in the reference soil material by AMA and ICP-MS.

	SRM 2709	
	Hg (AMA)	As (ICP-MS)
SD	0.04	1.86
RSD (%)	2.50	10.2
X_{aver} (mg kg⁻¹)	1.52	18.3
X_{cert} (mg kg⁻¹)	1.40	17.7
Err (%)	8.33	3.20

SD: standard deviation; RSD: relative standard deviation; X_{aver}: average value for measurements; X_{cert}: certified value; Err: error.

Table S2. Accuracy and precision obtained for HAPs analysis in the reference soil material by GC-MS.

CRM170	SD	RSD (%)	X _{aver} (µg kg ⁻¹)	X _{cert} (µg kg ⁻¹)	Err (%)
Naphthalene	49.9	10.4	480.9	484.0	0.6
Acenaphthylene	24.2	10.9	223.0	232.0	3.9
Acenaphthene	19.4	8.7	224.2	228.0	1.7
Fluorene	1.8	1.2	148.9	153.0	2.7
Phenanthrene	1.8	0.7	268.1	288.0	6.9
Anthracene	1.1	0.4	244.5	264.0	7.4
Fluoranthene	0.6	0.3	172.5	185.0	6.8
Pyrene	2.0	0.7	300.1	308.0	2.6
Benzo(a)anthracene	0.4	0.4	114.3	123.0	7.1
Chrysene	0.6	0.3	188.7	193.0	2.2
Benzo(b)fluoranthene	2.5	1.6	158.3	182.0	13.0
Benzo(k)fluoranthene	1.0	1.0	98.6	107.0	7.8
Benzo(a)pyrene	0.9	1.0	89.3	101.0	11.6
Indeno(1,2,3-cd)pyrene	1.7	1.0	173.6	200.0	13.2
Dibenzo(a,h)anthracene	2.5	2.2	115.2	119.0	3.2
Benzo(g,h,i)perylene	8.7	4.1	211.8	183.0	15.7

SD: standard deviation; RSD: relative standard deviation; X_{aver}: average value for measurements; X_{cert}: certified value; Err: error.

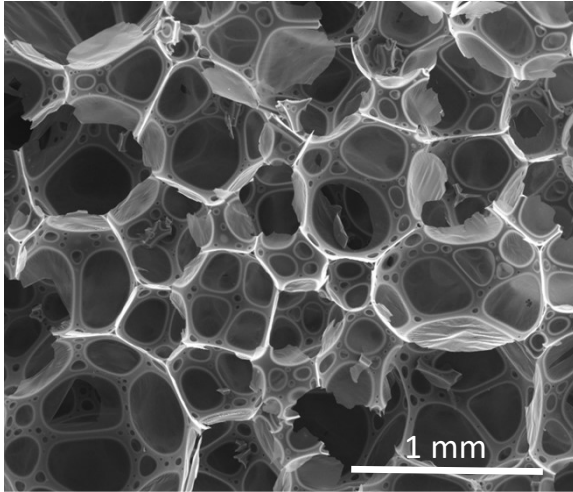


Figure S1. SEM image of the structure of sucrose foam.

Figure S2 presents a comparison of macropore size distribution for the sample SF in piece and sieved between 0.2-0.5 mm. The sample SF in piece form shows a wide pore size distribution between 180-50 μm , but this porosity was destroyed after grinding, remaining only a small fraction of pores centred at 10 μm . Consequently, the macropore volume calculated according to the Washburn's intrusion theory, was drastically reduced from $2.9 \text{ cm}^3 \text{ g}^{-1}$ to $0.6 \text{ cm}^3 \text{ g}^{-1}$.

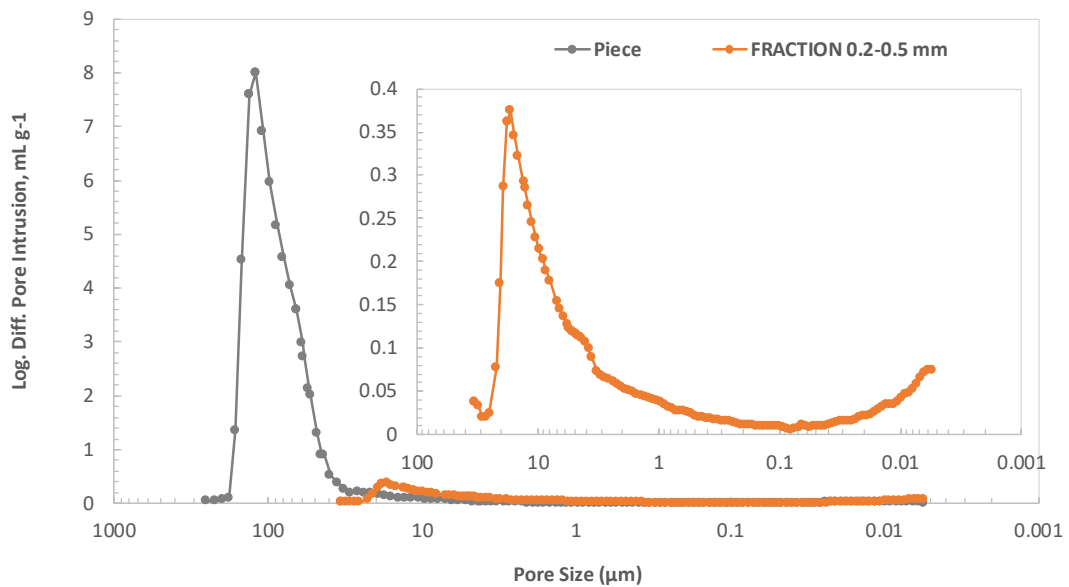


Figure S2. Comparison of pore size distribution obtained by Hg porosimetry for sucrose-carbon foam (SF) in piece and powder (0.2-0.5 mm) form.

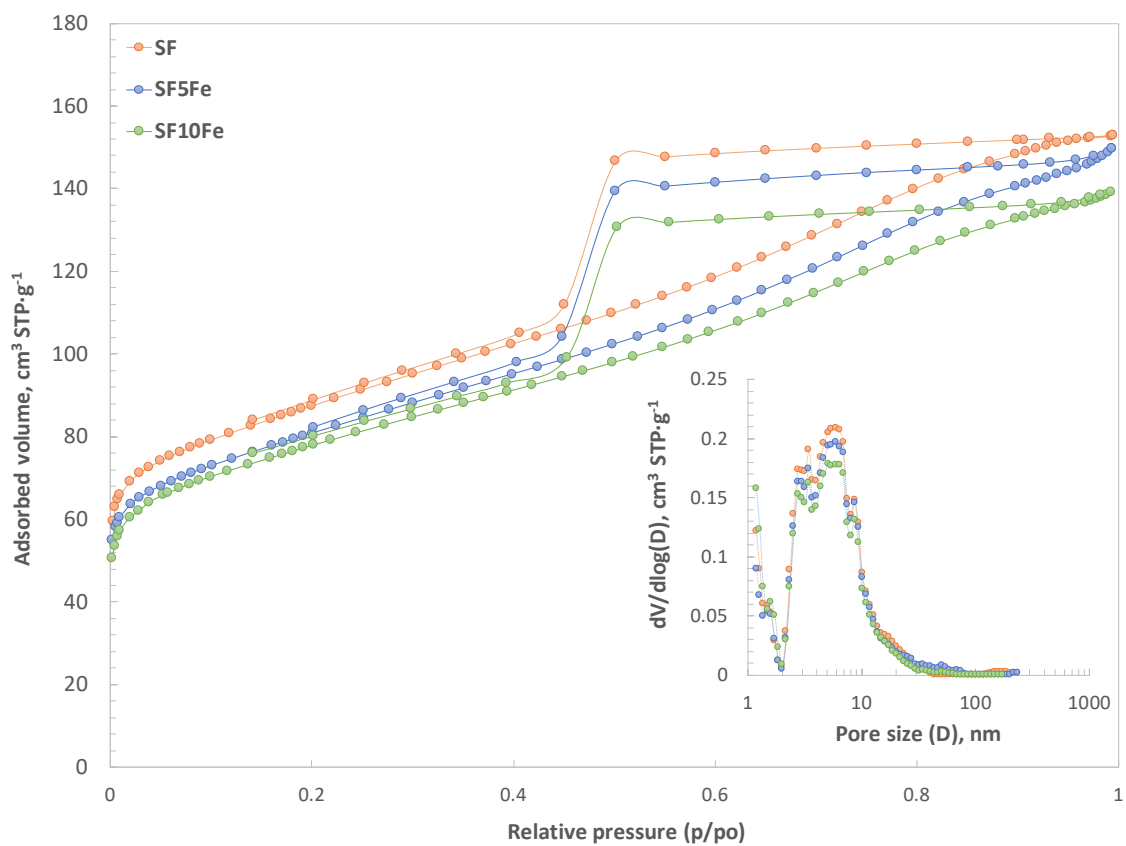


Figure S3. N₂ adsorption isotherms at -196 °C and pore size distribution of SF, SF5Fe and SF10Fe.

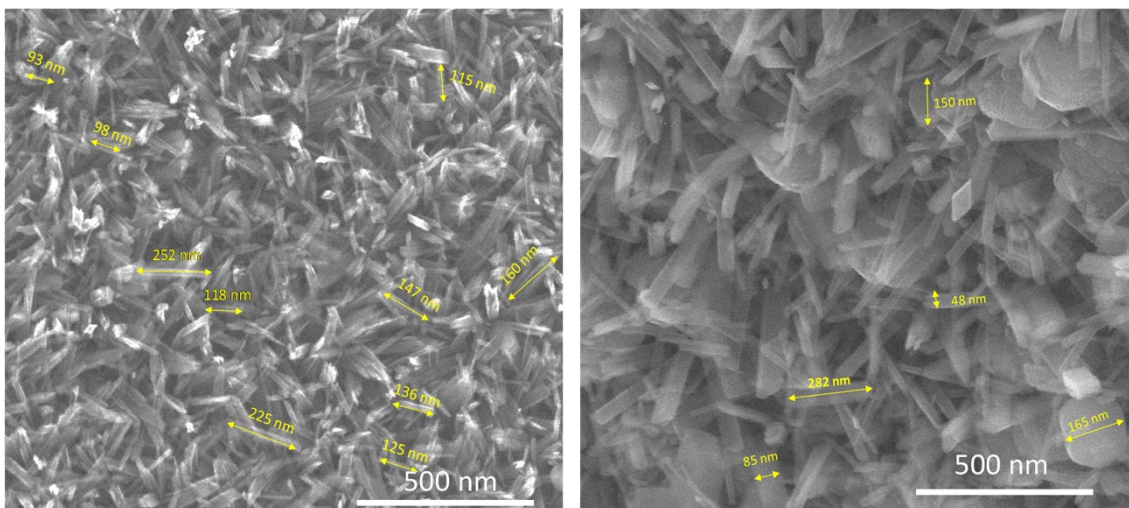


Figure S4. SEM images of the sucrose foams SF10Fe

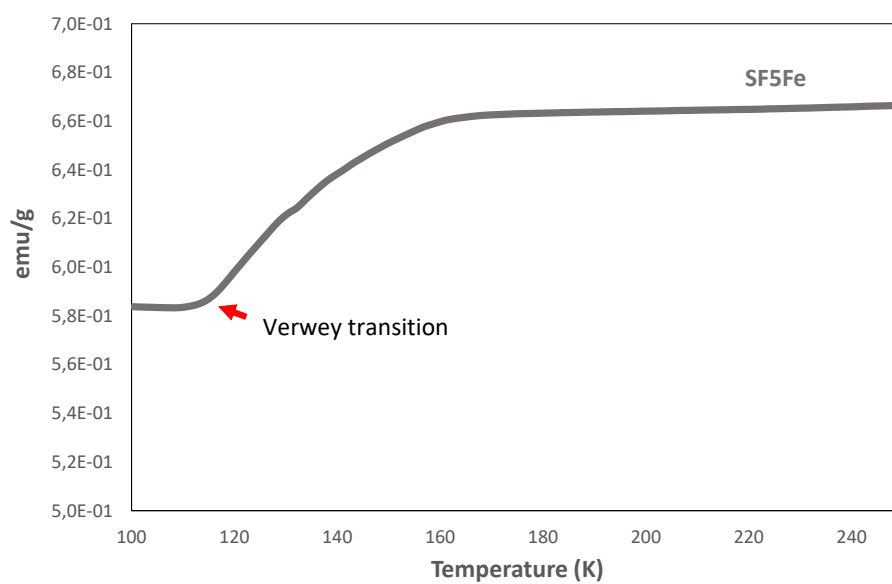


Figure S5. Magnetization as a function of temperature of SF5Fe.

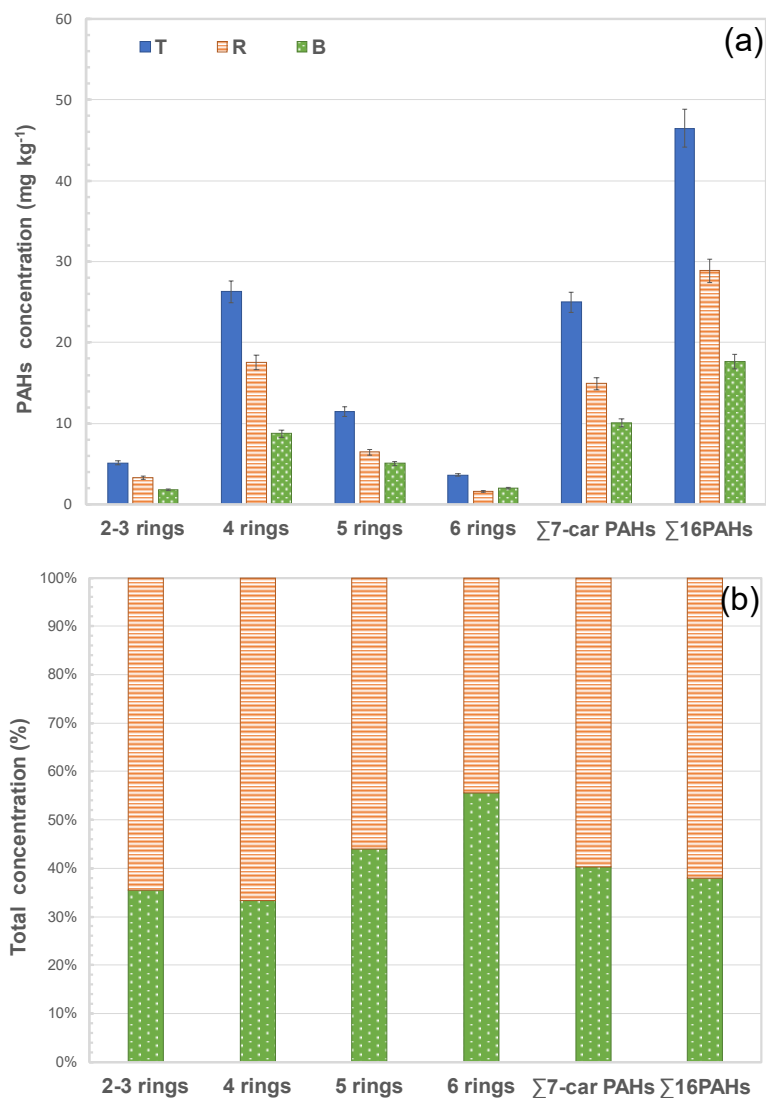


Figure S6. (a) Total (T), residual (R) and bioavailable (B) PAH concentrations of 2-3 rings, 4-rings, 5-rings and 6-rings, and the sum of 16 US EPA priority pollutants ($\Sigma 16\text{PAHs}$) and 7 carcinogenic PAHs ($\Sigma 7\text{-car PAHs}$), measured in soil M. (b) Distribution of bioavailable (B) and residual (R) concentration of PAHs related to the total content for each PAH group for soil M.

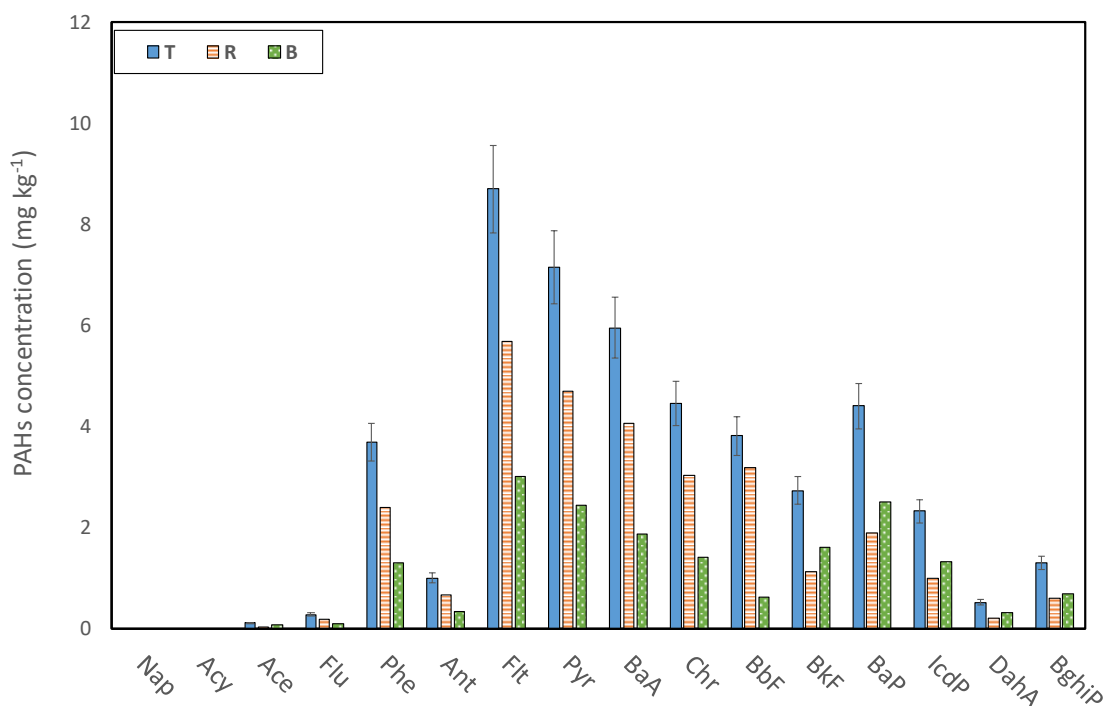
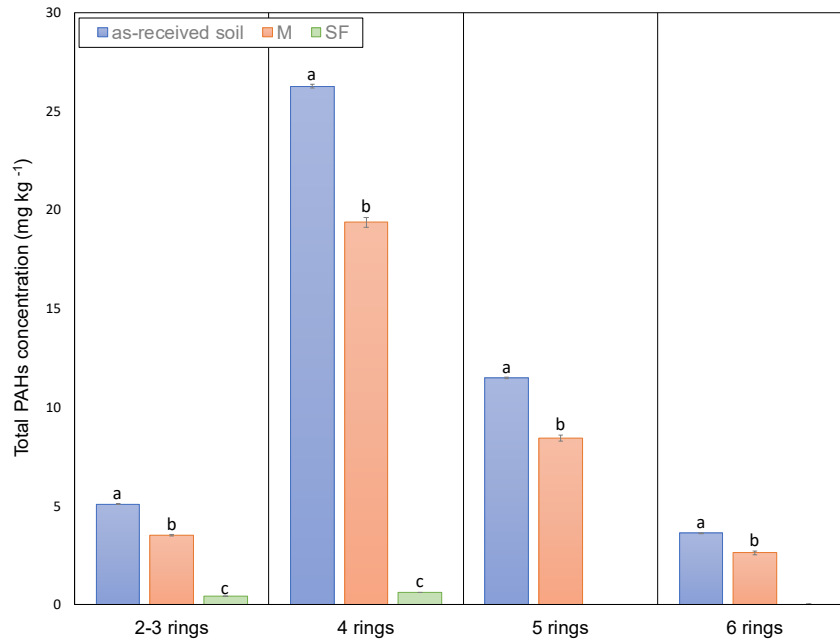
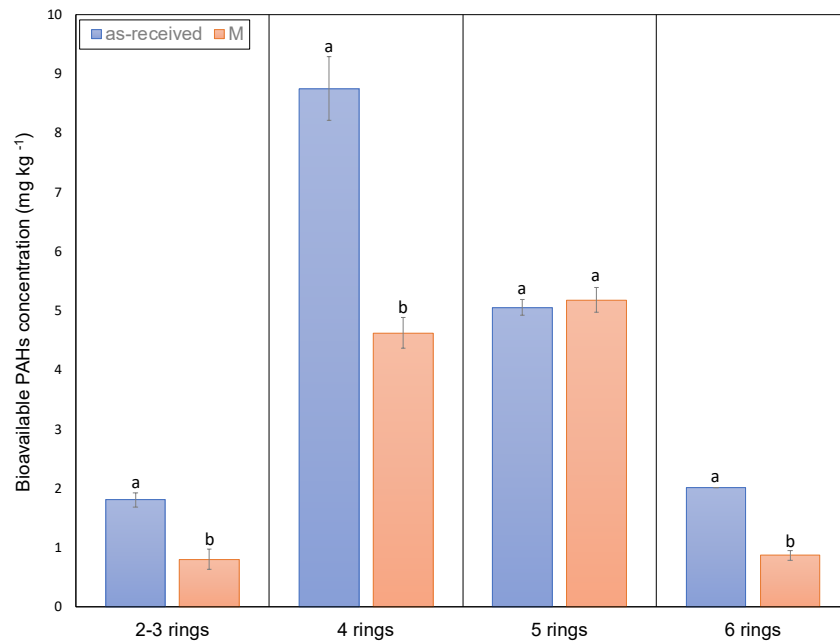


Figure S7. Total PAHs concentration (T), and residual (R) and bioavailable (B) PAHs concentration determined after HPCD extraction for soil M (mg/kg). Naphthalene (Nap); acenaphthylene (Acy); acenaphthene (Ace); fluorine (Flu); phenanthrene (Phe); anthracene (Ant); fluoranthene (Flt); pyrene (Pyr); benz(a)anthracene (BaA); chrysene (Chr); benzo(b)fluoranthene (BbF); benzo(k)fluoranthene (BkF); benzo(a)pyrene (BaP); indene(1,2,3-c,d)pyrene (IcdP); dibenz(a,h)anthracene (DahA); and benzo(g,h,i)perylene (BghiP)



(a)



(b)

Figure S8. Total (a) and bioavailable (b) PAH concentrations of 2/3-ringed (2-3 rings), 4-ringed (4-rings), 5-ringed (5-rings), and 6-ringed (6-rings) in As-received soil, control soil (M), and carbon foam SF (SF). Bars with the same letter do not differ significantly ($p < 0.05$) within each PAH group.