

ELECTRONIC SUPPLEMENTARY MATERIAL

Sustainable agro-waste pellets as granular slow-release fertilizer carrier systems for ammonium sulfate

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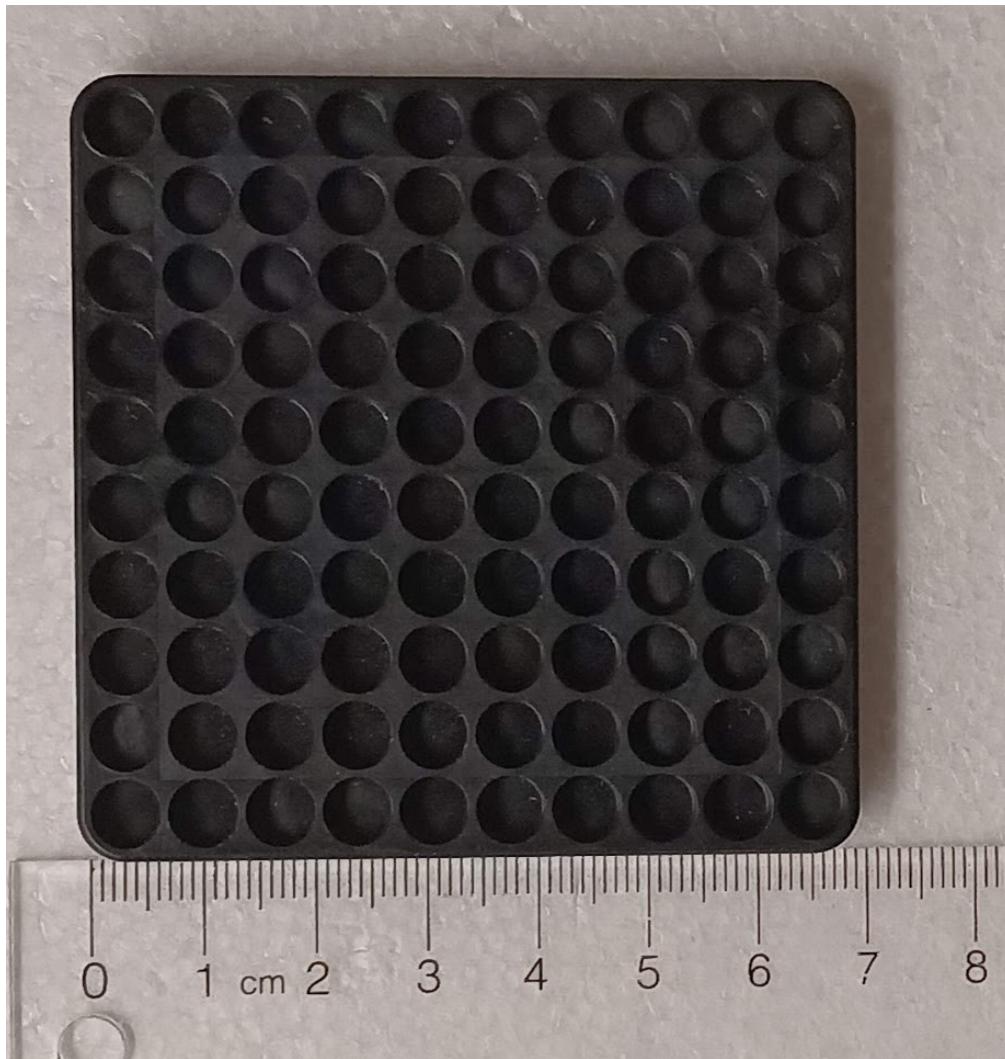


Figure S1: Picture of the mold/tray used to prepare the samples with scale (ca. 5.74mm diameter and 3.3 mm depth).

Table S1: Dimension of the round pellets in mm (sample size = 10).

	Diameter (mm)	Height (mm)
C1	5.60 ± 0.13	2.62 ± 0.16
C72	5.75 ± 0.09	2.77 ± 0.12
C20	5.13 ± 0.18	2.42 ± 0.20
C21	5.11 ± 0.17	2.49 ± 0.21
C22	5.06 ± 0.23	2.46 ± 0.14

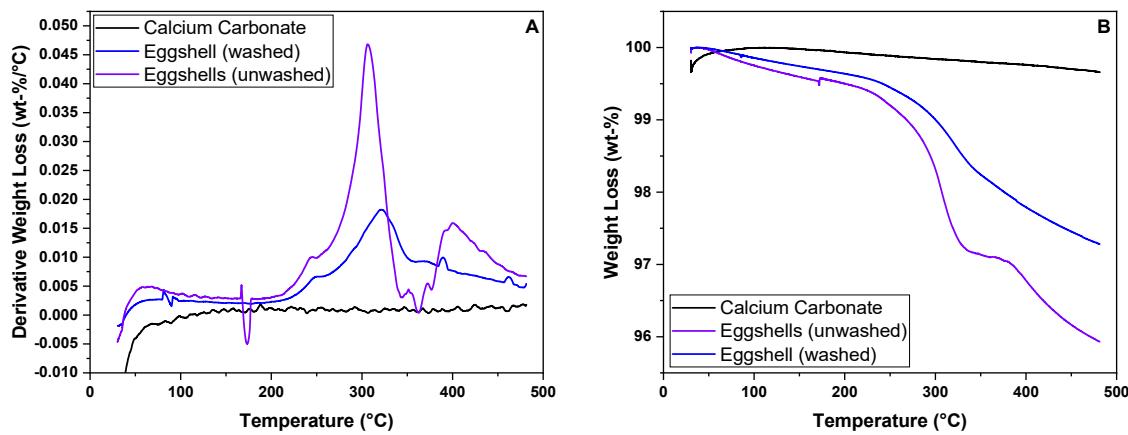


Figure S2: DTG profiles (A) of pristine calcium carbonate as comparison to eggshells (washed) and their weight loss profiles respectively (B).

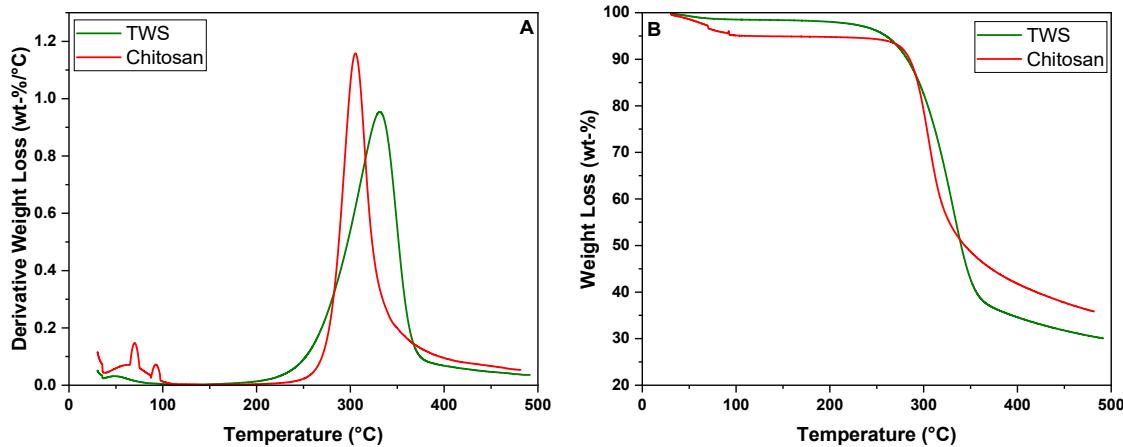


Figure S3: DTG profiles (A) of torrefied wheat straw (TWS) and chitosan and their TG profiles (B) respectively.

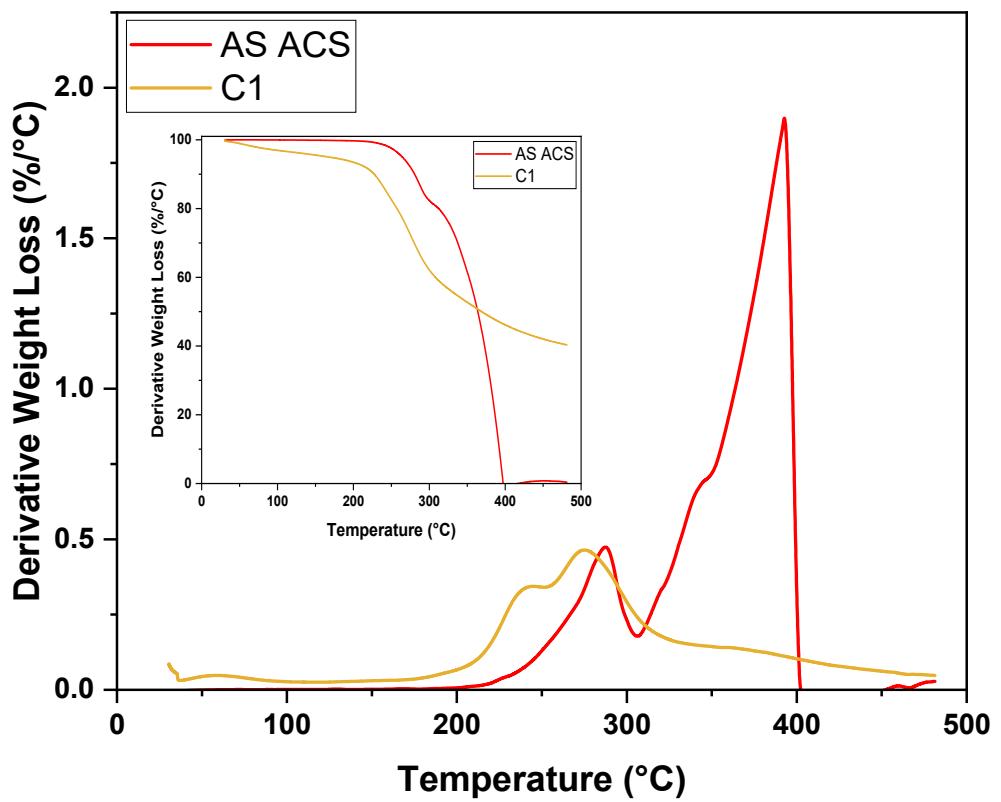


Figure S4: DTG profiles of ammonium sulfate (ACS grade) in comparison to C1 (TG profile as inset).

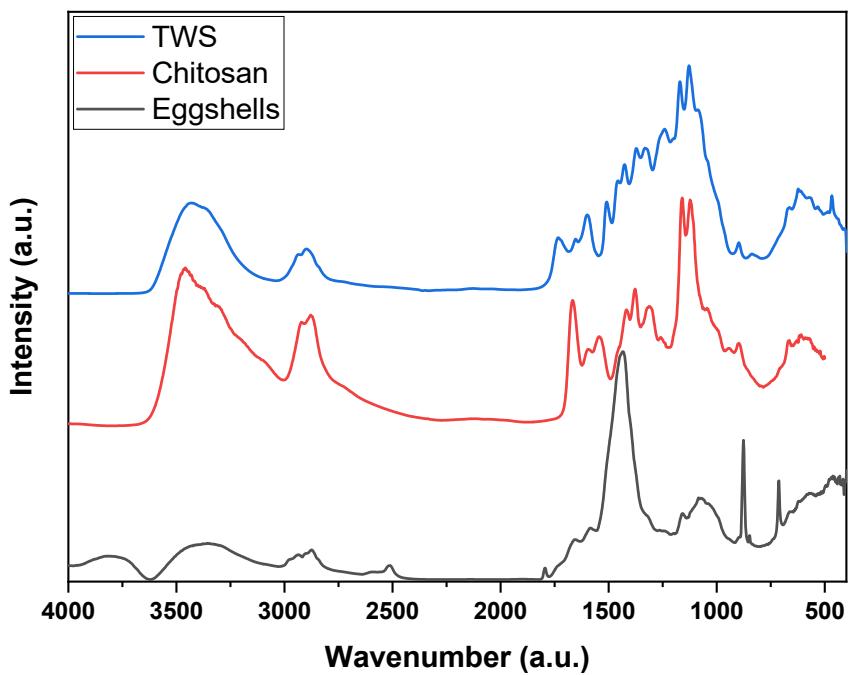


Figure S5: FT-IR Spectra of the raw materials used to prepare the pelletized adsorbents.

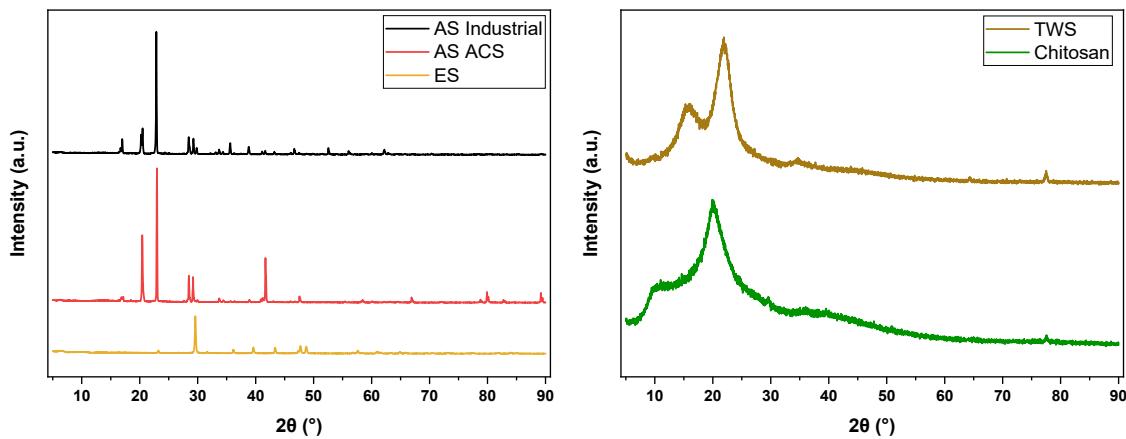


Figure S6: PXRD of the raw materials (eggshell, industrial and ACS grade ammonium sulfate on the left) and TWS and chitosan on the right.

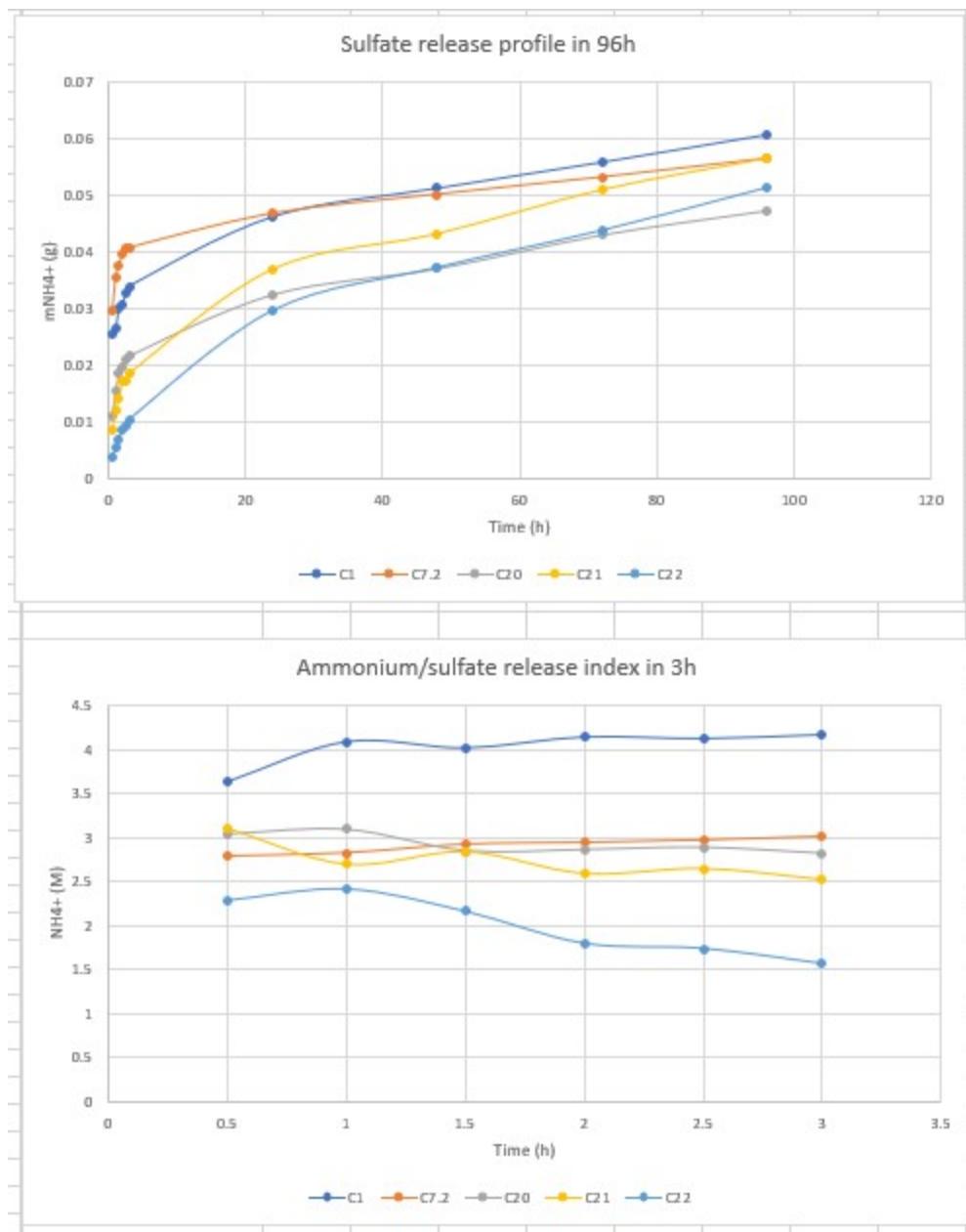


Figure S7: Sulfate release (g; upper graph) vs. molar ratio of ammonium to released sulfate (lower graph).

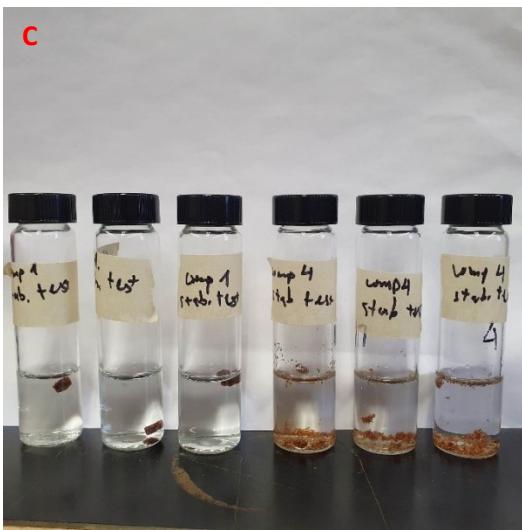
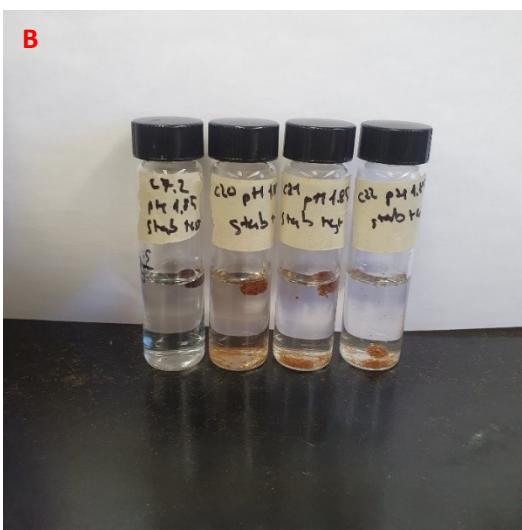
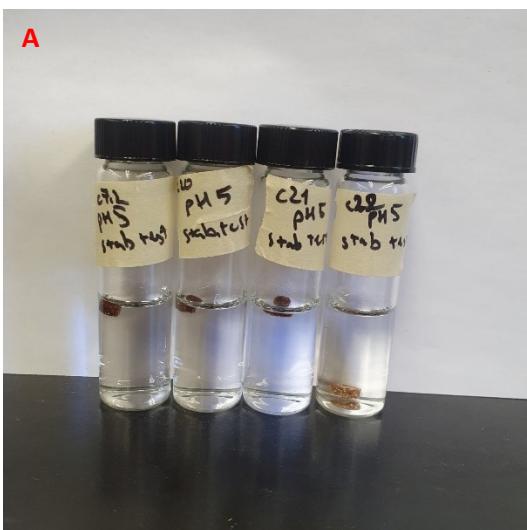


Figure S8: Stability of pellet systems (CW72,CW20-22) at pH 5 (A) and pH 1.85 (B), as well as preliminary testing of C1 and C4 in millipore water (C).

Table S2: Multi-factorial Analysis (ANOVA) for the granular SRFs and time as the main factors (ammonium release).

Source	Sum of squares	df	Mean square	F	Significance
Main effects					
• Pellets	3,00334	4	0,750834	6145,01	0,0000
• Time	0,00381111	2	0,00190556	15,60	0,0001
Residual	0,00281028	23	0,000122186		
Total	3,00996	29			

Table S3: ANOVA statistical analysis results for all pellet systems and time as main factors (cases:2) combined for all three time periods (3 h, 24 h, 48 h) resulting in 6 cases total (ammonium release).

Pellets	Cases	LS Mean	Homogeneous groups
C22	6	0,09055	A
C21	6	0,225675	B
C20	6	0,364678	C
C72	6	0,610587	D
C1	6	0,98677	E