

# Supplementary Material

## **Screening of Raw and Modified Biochars from Food Processing Wastes for the Removal of Phosphates, Nitrates, and Ammonia from Water**

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**Figure S1** Materials examined.

Table S1 Sorption capacity of various biochars for phosphates, nitrates and ammonia

Matrix	Sorbent	Temperature	pzc	pH	q <sub>max</sub> <sup>+</sup> (mg/g)	Reference
Phosphates						
KH <sub>2</sub> PO <sub>4</sub> +K <sub>3</sub> PO K <sub>2</sub> HPO <sub>4</sub> in DW	Rice straw	800		7	5.58	(Liu et al., 2019)
	Egg shells + Rice straw 2:1	800		7	204	(Liu et al., 2019)
	Egg shells + Rice straw 1:1	800		7	231	(Liu et al., 2019)
	Egg shells + Rice straw 1:2	800		7	159	(Liu et al., 2019)
	Egg shell + Rice straw 1:4	800		7	96.4	(Liu et al., 2019)
KH <sub>2</sub> PO <sub>4</sub> in DI	Sugar beet tailings Mg modified	600			835	(Zhang et al., 2012)
KH <sub>2</sub> PO <sub>4</sub> in laboratory- grade water	Egg shells	600		7	19.23	(Panagiotou et al., 2018)
	Egg shells	800		7	7.94	(Panagiotou et al., 2018)
	Egg shells	900		7	31.74	(Panagiotou et al., 2018)
KH <sub>2</sub> PO <sub>4</sub> in DW	Egg shells	700		7.3	121	(Torit and Phihusut, 2019)
NaH <sub>2</sub> PO <sub>4</sub> .2H <sub>2</sub> O in DW	Salted duck egg shells	700			8.17	(Yirong and Vours, 2019)
	Egg shells	700			6.57	(Yirong and Vours, 2019)
KH <sub>2</sub> PO <sub>4</sub> in DI	Coal gangue modified oilseed rape straw	700		4	7.9	(Wang et al., 2021)
KH <sub>2</sub> PO <sub>4</sub> in DW	EGS800	800	10.3	6-7.8	11.45	Present study
	EGS800Mg	800	11.3	6.1-7.9	4.63	Present study
	RH800	800	10	5.5-7.9	4.37	Present study
	RH800Mg	800	11.8	6.3-8.8	6.62	Present study
Nitrates						
NaNO <sub>3</sub> in DI	Peanut shells Mg modified	600			94	(Zhang et al., 2012)
NaNO <sub>3</sub> in DW	EGS800	800	10.3	7.9-8.9	3.04	Present study
	EGS800Mg	800	11.3	8-8.7	1.71	Present study
	RH800	800	10	6.1-7	4.79	Present study
	RH800Mg	800	11.8	8-9.9	5.24	Present study
Ammonia						
NH <sub>4</sub> Cl in DW	EGS800	800	10.3	5.5-7.2	11.59	Present study
	EGS800Mg	800	11.3	5.5-7.4	9.54	Present study
	RH800	800	10	4.4-7.1	4.01	Present study
	RH800Mg	800	11.8	4.5-7.1	10.34	Present study

<sup>+</sup> q<sub>max</sub> is given in mg of P/mg for phosphates, and mg N/g for nitrates and ammonia nitrogen.

Table S2 Scanning electron microscope images of the biochars studied.

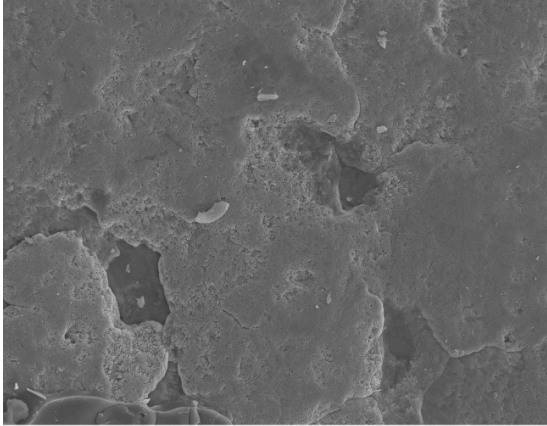
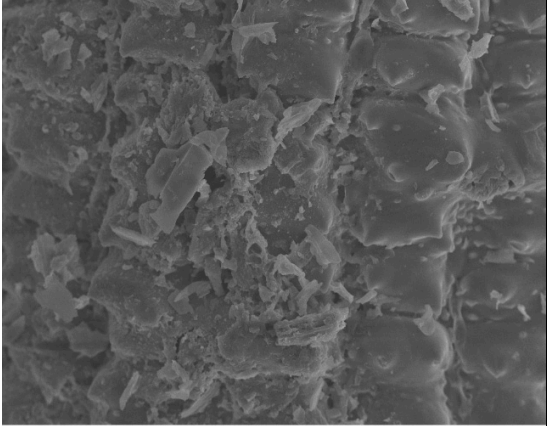
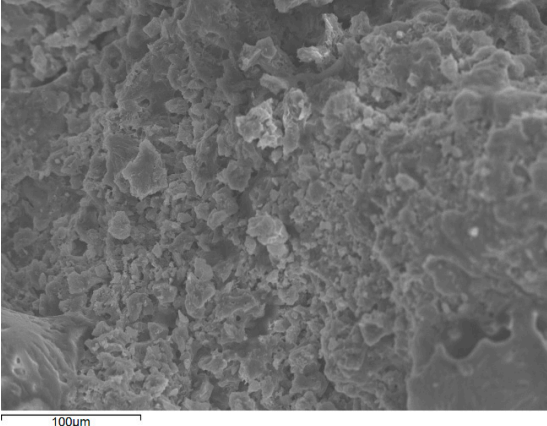
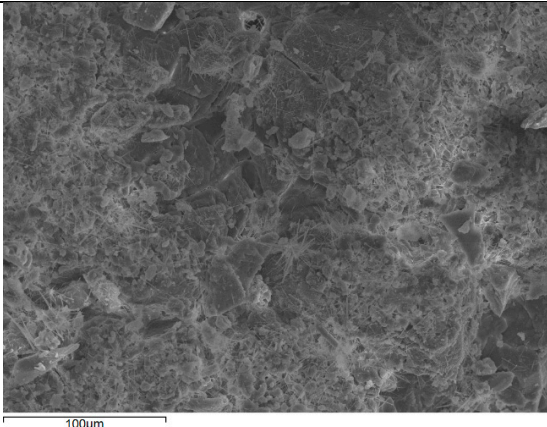
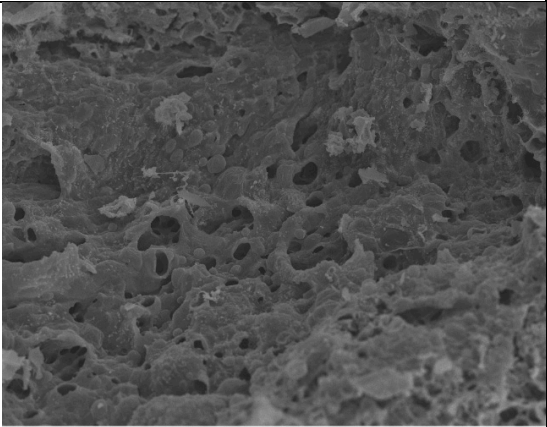
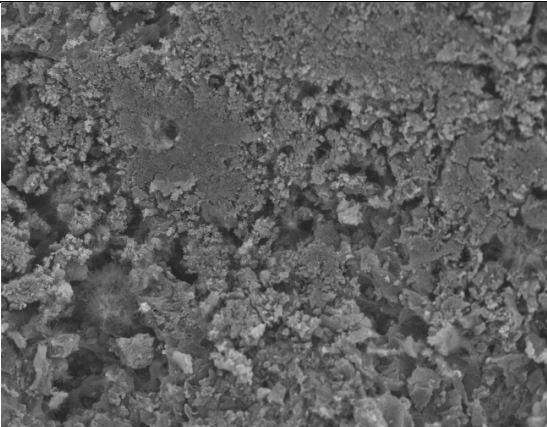
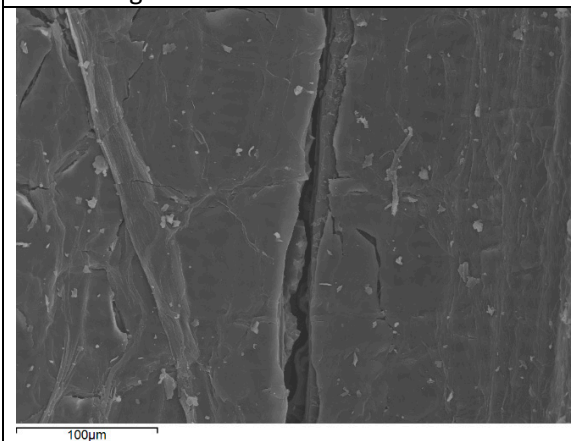
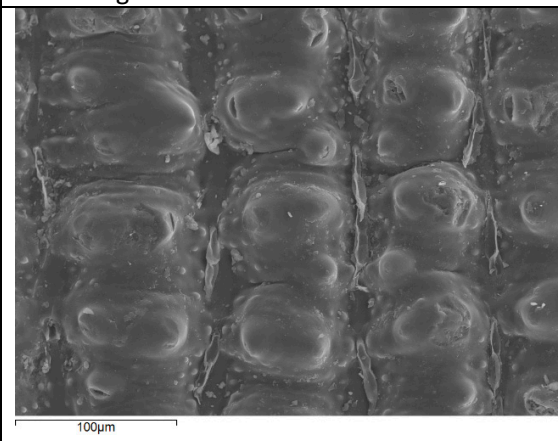
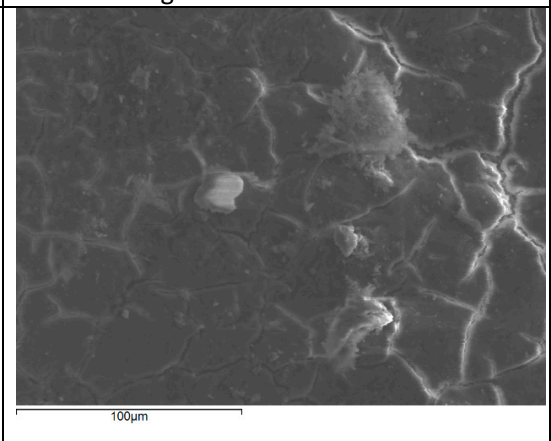
EGS400	RH400	Coffee400
		
EGS800	RH800	Coffee800
		

Table S2 (continued) Scanning electron microscope images of the biochars studied.

EGS400Mg	RH400Mg	Coffee400Mg
		
EGS800Mg	RH800Mg	Coffee800Mg
