

Supplementary Material

Synthesis of a functionalized fibrous adsorbent of high uptake capacity: A study on Pb(II) uptake and simple acidic site model development

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Table S1 Proximate & ultimate analyses and BET surface area of RFA and FFA.

Sample	Proximate analysis, (%)			Ultimate analysis, (%)					BET area, (m ² g ⁻¹)
	Ash	Volatile matter	Moisture content	C	H	O	N	S	
RFA	2.93	90.37	6.4	47.6	6.31	45.8	0.18	0.02	1.06
FFA	3.08	93.91	3.01	52.7	3.58	42.4	Nil	1.23	13.69

Table S2 Comparison of adsorption capacities of adsorbents prepared using different acids with FFA in present study.

Precursor	Modifying agent	Metal	Test conditions	q_{max} , $mg\ g^{-1}$	Source	
Rice husk	Tartaric acid	Cu(II) Pb(II)	Initial Pb 400-1200 $mg\ L^{-1}$ Initial Cu 100-450 $mg\ L^{-1}$ Adsorbent dosage 5 $g\ L^{-1}$ 150 rpm, 4 h, pH 4 Langmuir Capacity	31.85 120.48	Wong et al., 2003	
Sawdust (Poplar tree)	Sulfuric acid	Cu(II)	Initial Cu 30-150 $mg\ L^{-1}$ Adsorbent dosage 5 $g\ L^{-1}$ 200 rpm, 1 h, pH 5.5 Langmuir Capacity, 1 N H_2SO_4 1:2 (sawdust/ H_2SO_4 ; w/v)	13.95	Acar and Eren, 2006	
Sawdust (Oak tree)	Hydrochloric acid	Cu(II) Ni(II) Cr(VI)	40 $g\ L^{-1}$, pH 4 30 $g\ L^{-1}$, pH 8 60 $g\ L^{-1}$, pH 3 Metal 0.1-100 $mg\ L^{-1}$, HCl treated adsorbents, Langmuir capacity	3.60 3.37 1.74	Argun et al., 2007	
Peanut husk	Sulfuric acid	Pb(II) Cr(III) Cu(II)	5-50 $mg\ L^{-1}$, pH 4, 200 rpm, dose 2 $g\ L^{-1}$, Langmuir capacity, Cu and Pb 1 h, Cr 6 h	29.14 7.67 10.15	Li et al., 2007	
Wheat bran	Sulfuric acid	Cu(II)	150 rpm 2 h, dose 1 $g\ L^{-1}$, initial Cu 25-250 $mg\ L^{-1}$	51.5	Ozer et al., 2004	
Banana pith	Nitric acid	Cu(II)	5 $g\ L^{-1}$, 10-100 $mg\ L^{-1}$, pH 4.4, 200 rpm, Langmuir isotherm	13.46	Low et al., 1995	
Corn cob	Nitric acid	Cd(II)	Initial Cd(II) 5-120 $mg\ L^{-1}$, Adsorbent dose 0.1-1 $g\ L^{-1}$, pH 6, equilibrium time 5 d	19.30	Leyva-Ramos et al., 2005	
Areca nut husk	Sulphuric acid	Pb(II)	Initial Pb(II) 32 $mg\ L^{-1}$, pH 5, FFA dose 1 $g\ L^{-1}$, 30 °C, 5 h 180 rpm	After 1 st cycle	31.47	Present study
				After 12 th cycle	194.94	

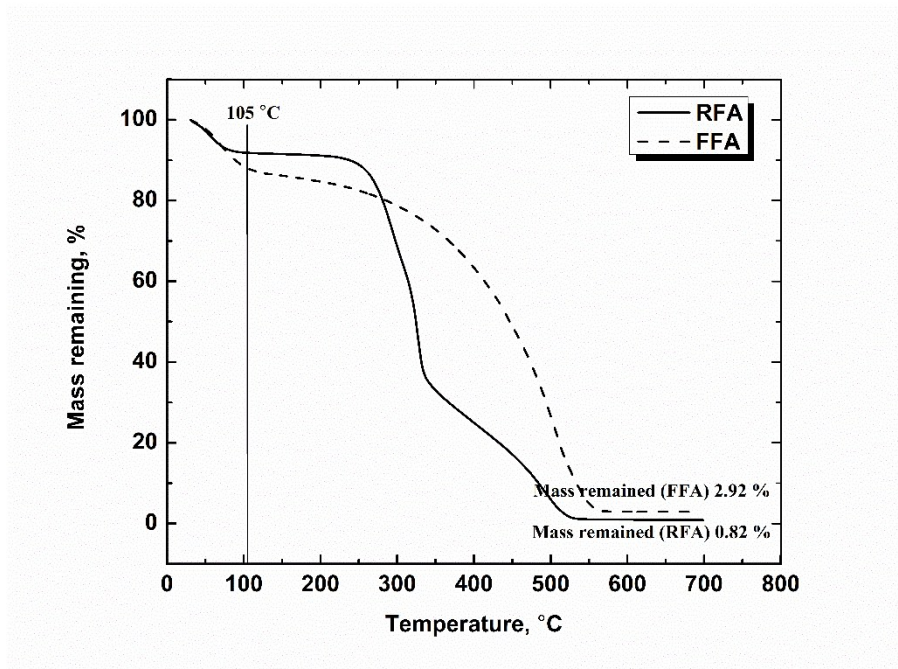


Fig. S1 Thermogravimetric analysis of RFA and FFA showing its degradation as a function of temperature (range 30-700 °C).

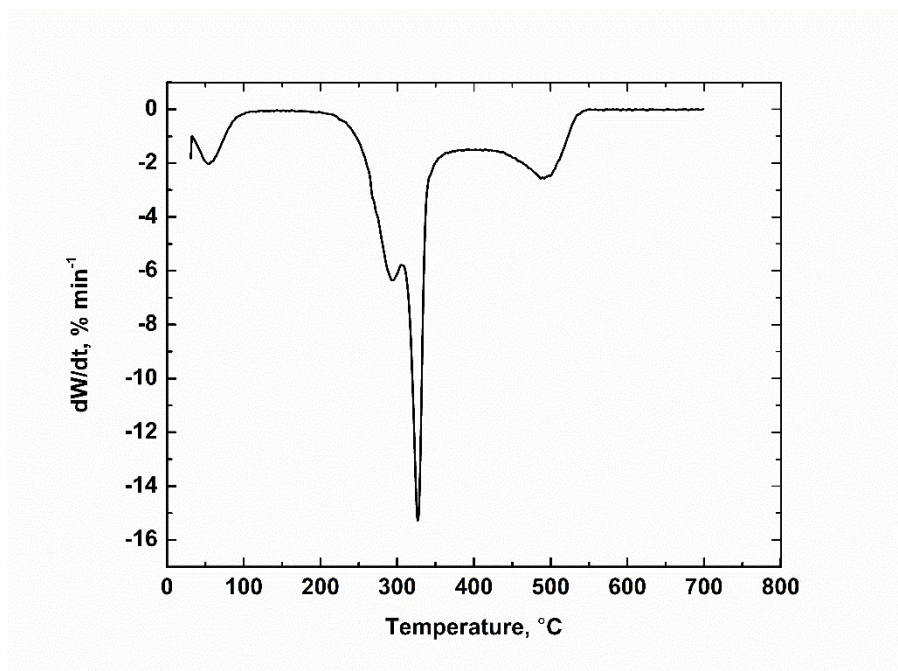


Fig. S2 Differential thermogravimetric analysis of RFA (range 30-700 °C).

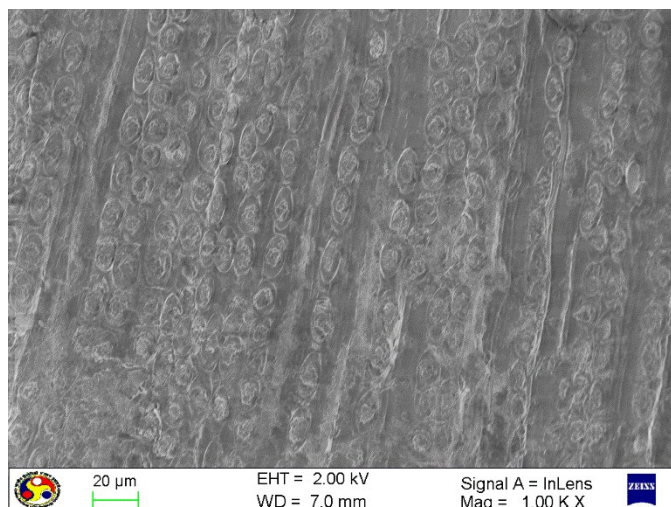


Fig. S3 FESEM image of RFA (magnification 1000X).

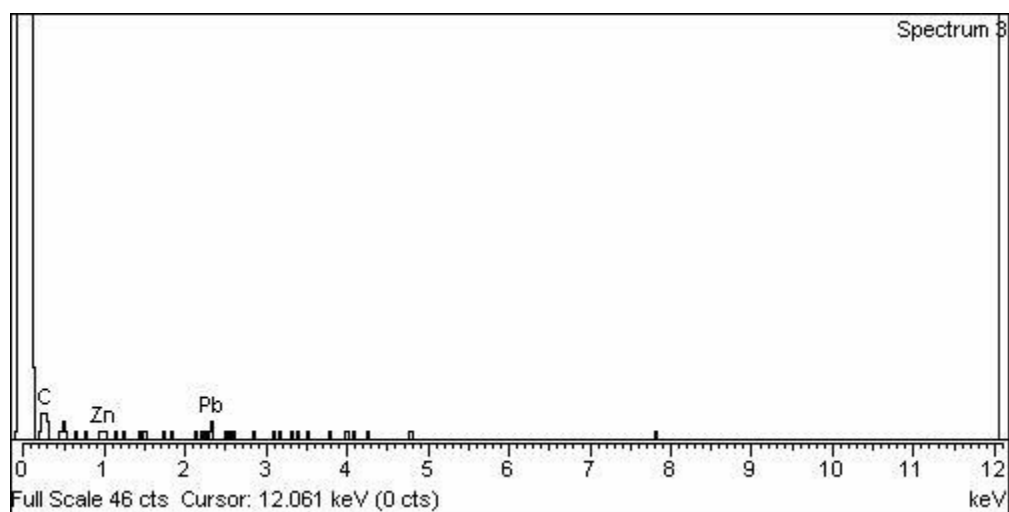


Fig. S4 EDX spectrum of Pb(II) loaded FFA. Experimental Pb(II) loading of 75 mg per g FFA after 5 h of contact at 30 °C and agitation speed of 180 rpm.

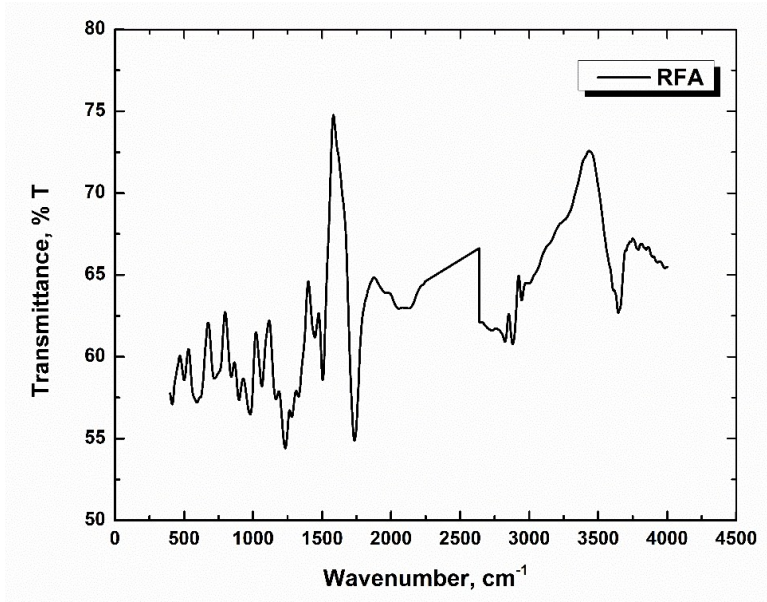


Fig. S5 FTIR spectra of virgin RFA.

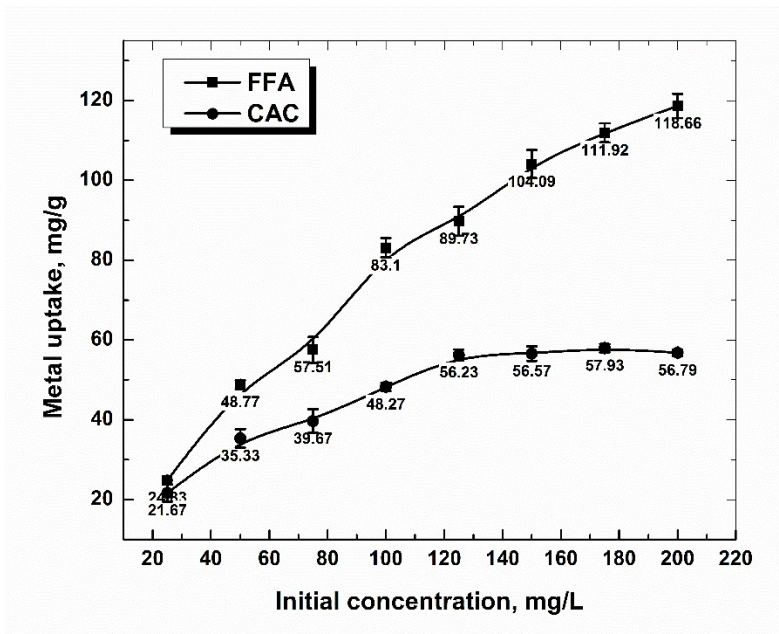


Fig. S6 Pb(II) uptake capacities at different initial concentrations (initial Pb(II) concentration 25 to 200 mg L⁻¹, adsorbent dosage 1 g L⁻¹, agitation speed 180 rpm, temperature 30 °C, contact/equilibrium time 5 h).

References

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