Supporting information

Preparation of high-yield N-doped biochar from nitrogen-containing phosphate and its effective adsorption for toluene

Qiying Zhou,[†] Xia Jiang, [*,†,‡] Xi Li [a], [†] Charles Q. Jia,[§] and Wenju Jiang [†,‡]

[†] College of Architecture and Environment, Sichuan University, Chengdu 610065, China

[‡] National Engineering Research Center for Flue Gas Desulfurization, Chengdu 610065, China

[§] Department of Chemical Engineering & Applied Chemistry, University of Toronto, 200 College St., Toronto, Ontario M5S 3E5, Canada

*Corresponding author: Xia Jiang

Tel.: +86 28 85467800; fax: +86 28 85405613.

E-mail address: xjiang@scu.edu.cn (X. Jiang)

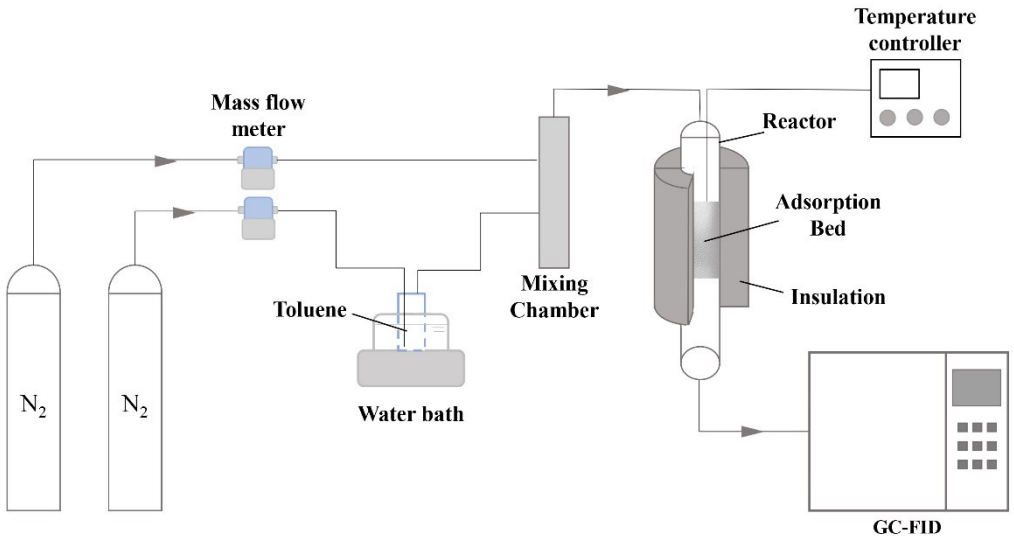


Fig. S1. Schematic of the fixed bed system for toluene adsorption

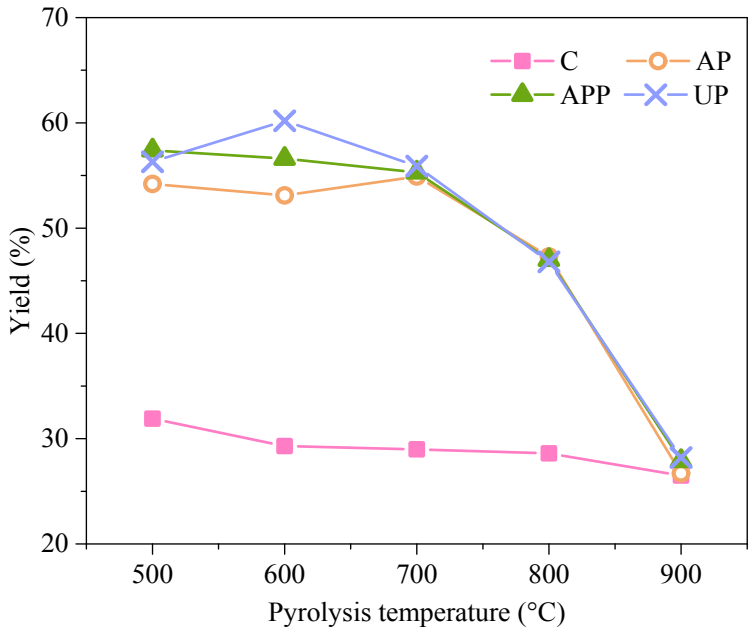


Fig. S2. The yields of prepared carbon with the addition of different nitrogen-containing phosphates

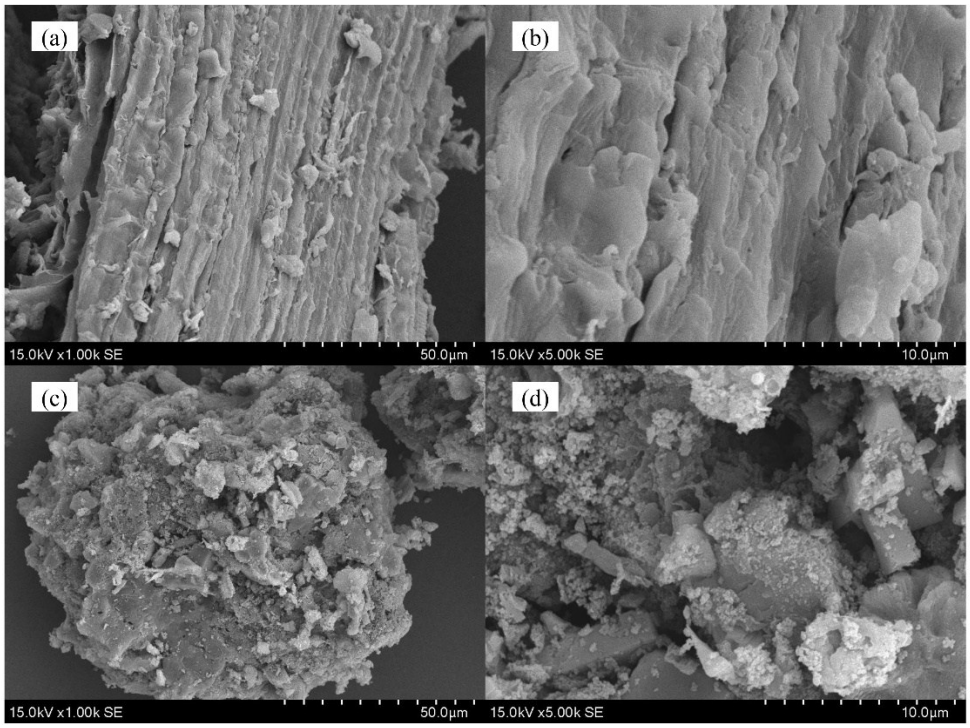


Fig. S3. SEM images of C-600 ((a) and (b)), and AP-600 ((c) and (d))

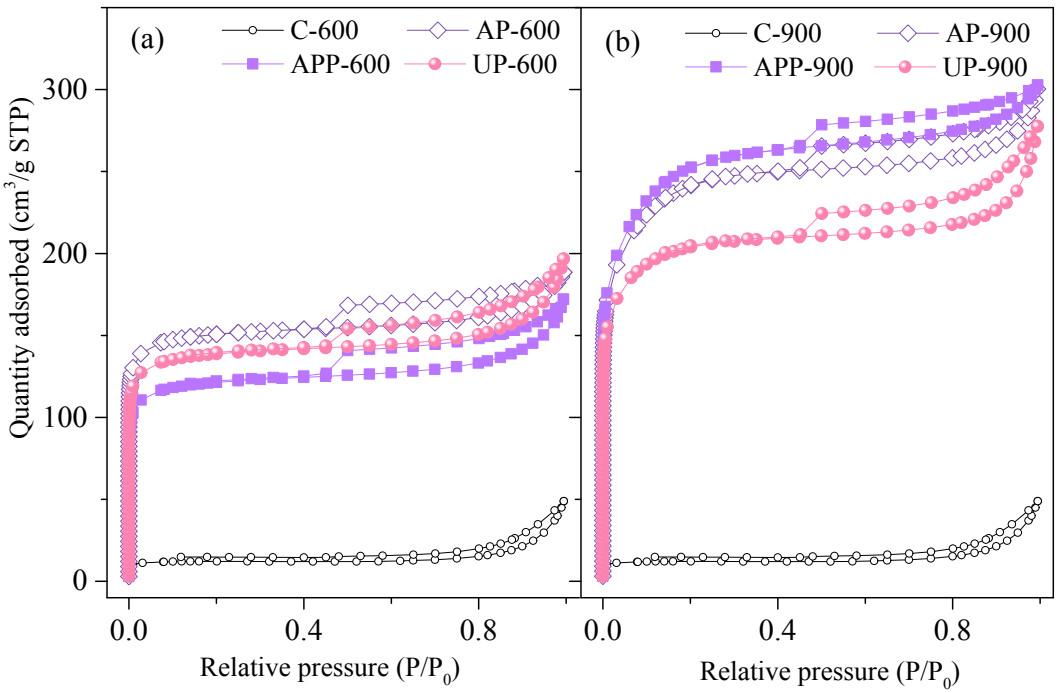


Fig. S4. Nitrogen adsorption-desorption isotherms of prepared carbon at 600 °C (a) and 900 °C (b)

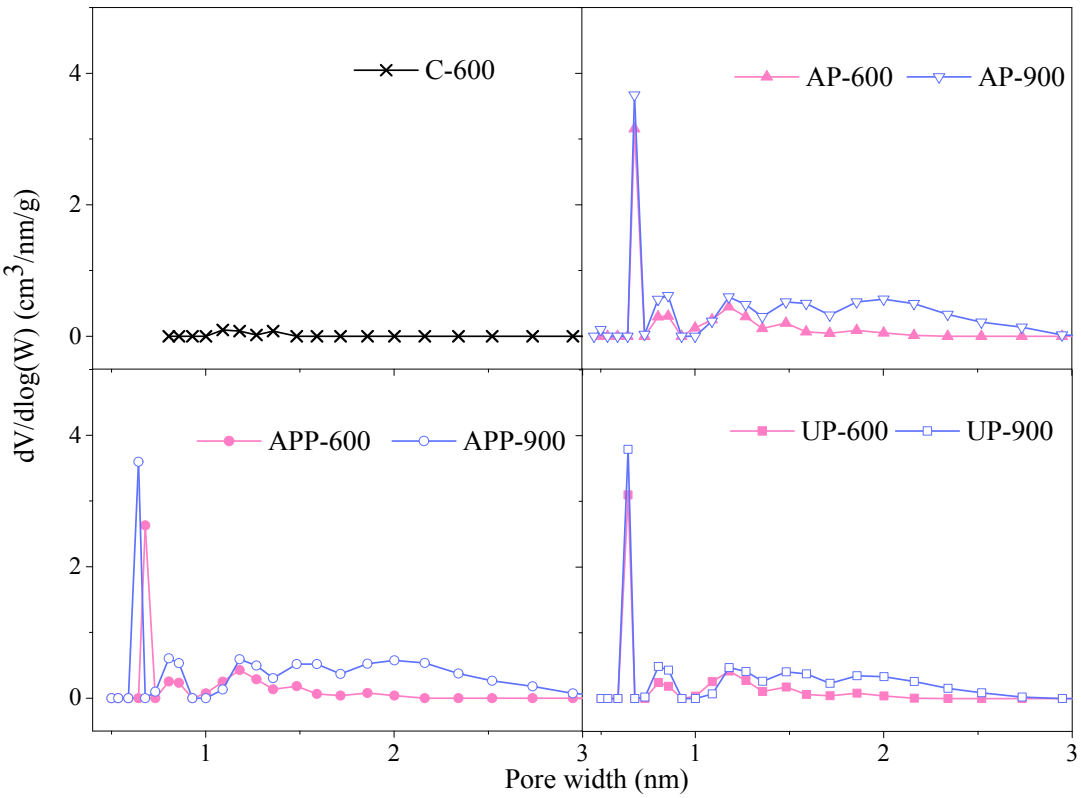


Fig. S5. Pore size distribution of the prepared carbon

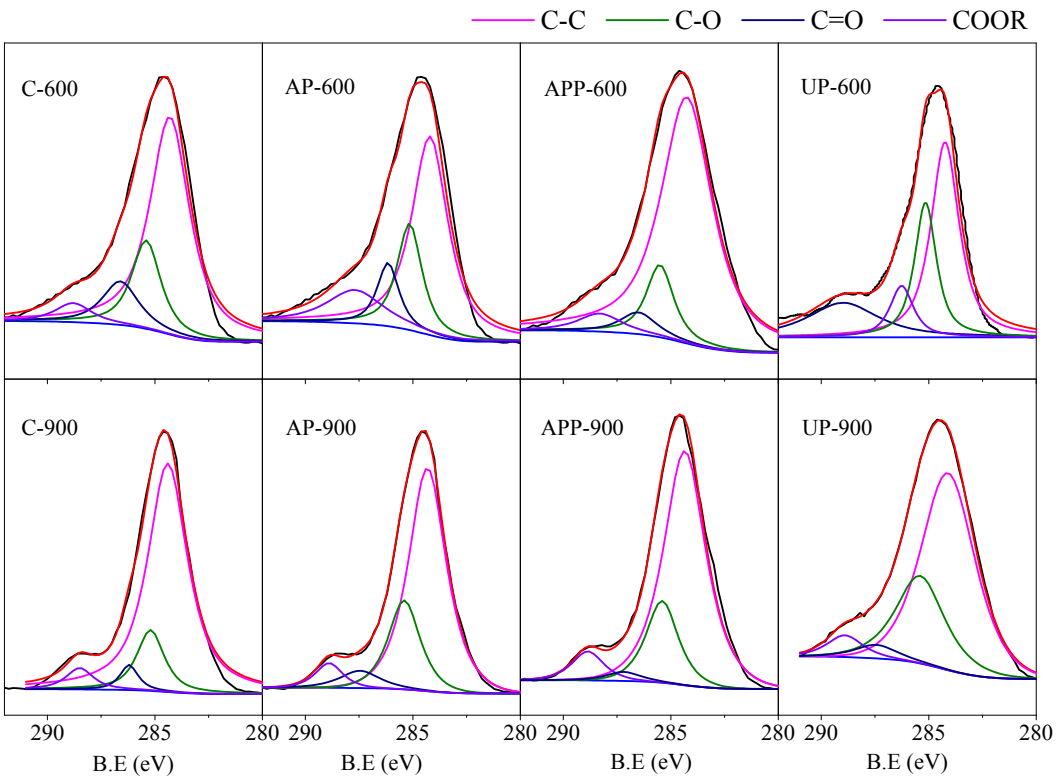


Fig. S6. High resolution XPS spectra for C 1s of the prepared carbon

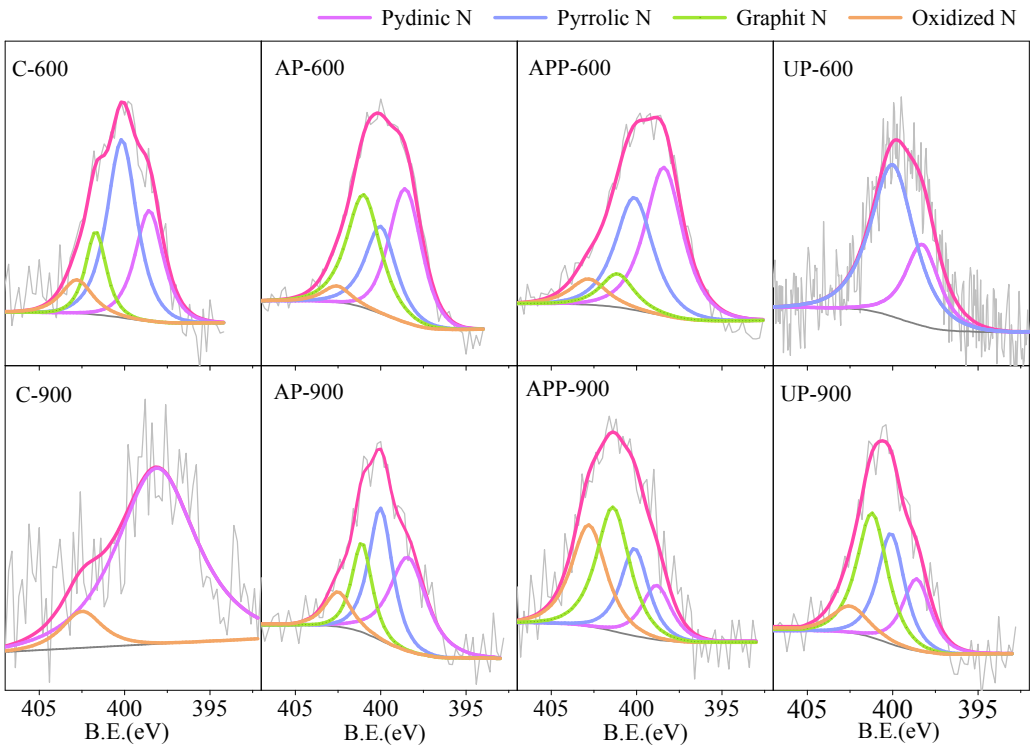


Fig. S7. High resolution XPS spectra for N 1s of prepared carbon

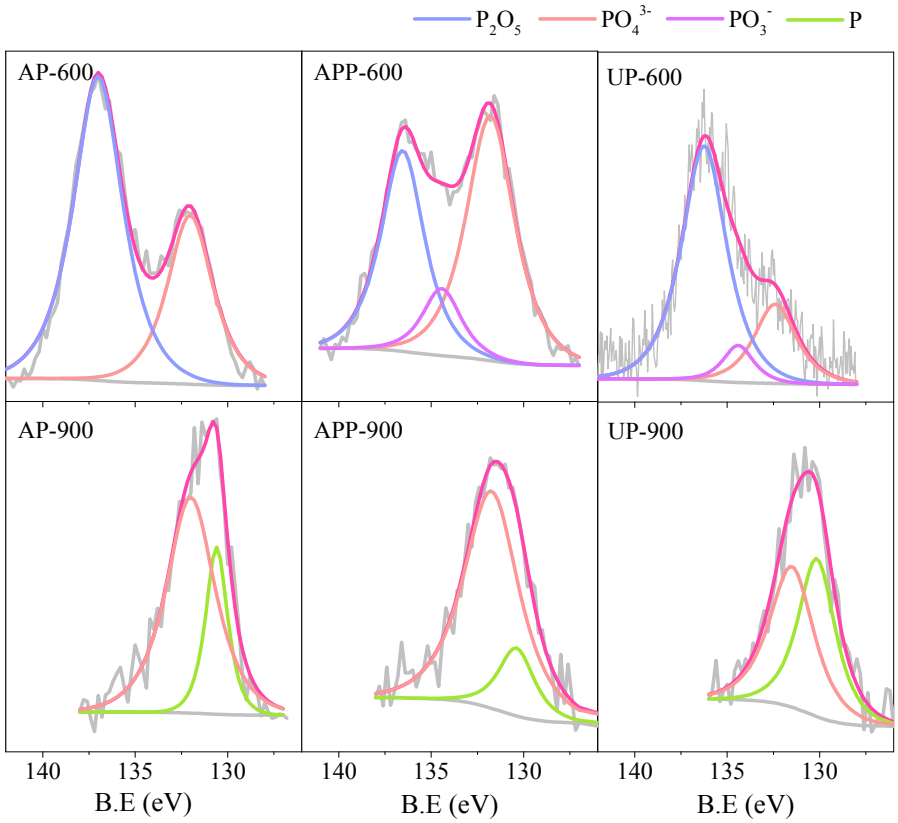


Fig. S8. High resolution XPS spectra for P 2p of prepared carbon

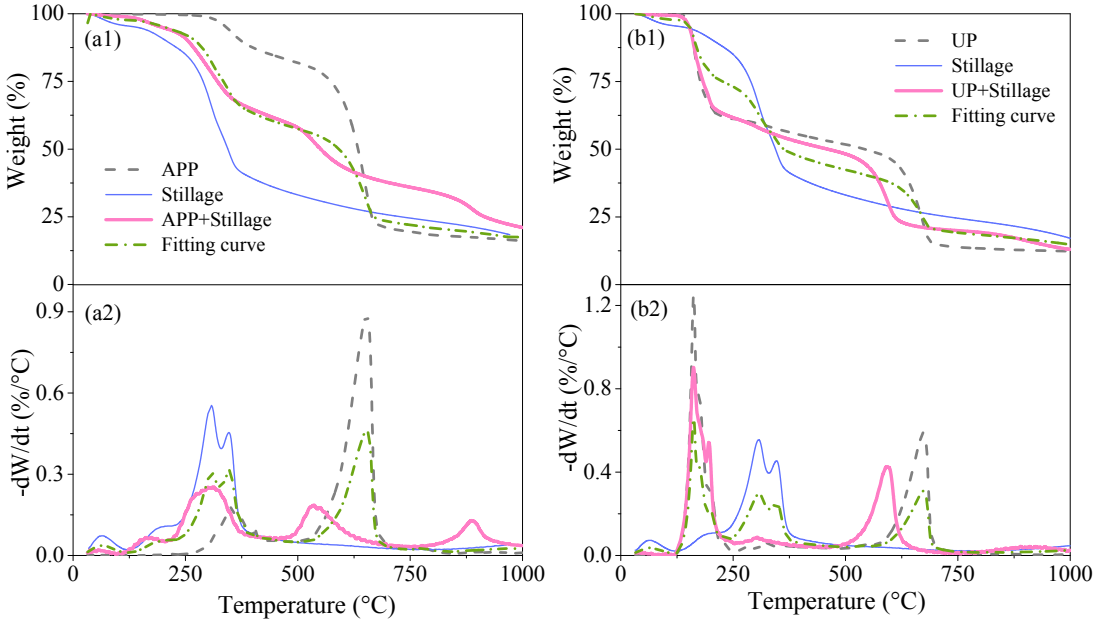


Fig. S9. TG analysis of pristine stillage, mixture of tillage and APP (a) and UP (b) (TG curve (1), DTG curve (2))

Table S1 Characteristics of nitrogen-containing phosphates

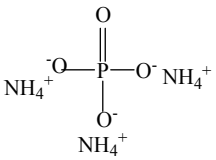
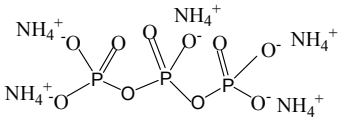
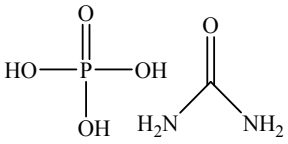
NC P	Formula	N (%)	P (%)	Structural formula
AP	$(NH_4)_3PO_4$	28.1	20.8	
APP	$(NH_4)_{n+2}P_nO_{3n+1}$	17.0	31.0	
UP	$CO(NH_2)_2 \cdot H_3PO_4$	17.7	19.5	

Table S2 Bulk density of the prepared carbon

Sample	Bulk density (g/cm^3)	Sample	Bulk density (g/cm^3)
AP-600	0.48	AP-900	0.32
APP-600	0.36	APP-900	0.28
UP-600	0.56	UP-900	0.45