

Supporting Information

New insights into the enhancement effect of exogenous calcium on biochar stability during its aging in farmland soil

Hongyan Nan^{1,2}, Yunqiu Jiang³, Weiqi Zhou⁴, Ling Zhao^{2,5}, Fan Yang^{6,*}

¹*School of Chemical Engineering, Zhengzhou University, Henan 450001, China*

²*School of Environmental Science and Engineering, Shanghai Jiao Tong University, Shanghai 200240, China*

³*Hydrology and water resources Survey Bureau of the upper reaches of the Yangtze River, Hydrology Bureau of Yangtze River Water Resources Commission, Chongqing 400010, China*

⁴*Shanghai Investigation, Design & Research Institute Co., Ltd, Shanghai 200050, China*

⁵*China-UK Low Carbon College, Shanghai Jiao Tong University, Shanghai 201306, China*

⁶*School of Environment and Architecture, University of Shanghai for Science and Technology, Shanghai 200093, China*

*Corresponding author: Fan Yang

E-mail: yangfanusst@usst.edu.cn

Table S1. Main element contents and pore structure parameters of four biochars.

Biochar	Ash %	C %	O %	H %	N %	Ca $\text{g}\cdot\text{kg}^{-1}$	SA-N ₂ $\text{m}^2\cdot\text{g}^{-1}$	PS nm
SSBC	54.3±1.2	24.2±0.1	9.28±0.2	1.44±0.2	3.50±0.1	17.8±1.2	8.50	2.18
Ca-SSBC	60.1±0.8	19.1±0.1	6.61±0.1	1.46±0.1	2.41±0.1	96.6±3.2	6.04	4.22
BDBC	55.3±0.1	17.2±0.7	17.0±0.1	1.23±0.1	2.63±0.1	99.4±7.2	89.6	9.73
Ca-BDBC	83.8±0.4	12.5±0.9	13.1±0.2	2.47±0.2	1.90±0.2	153±10.7	119.7	6.79

SSBC: sewage sludge biochar; Ca-SSBC: CaCl₂+sewage sludge biochar; BD: bone dreg biochar;
Ca-BDBC: CaCl₂+bone dreg biochar; SA: BET-N₂ surface area; PS: pore size.

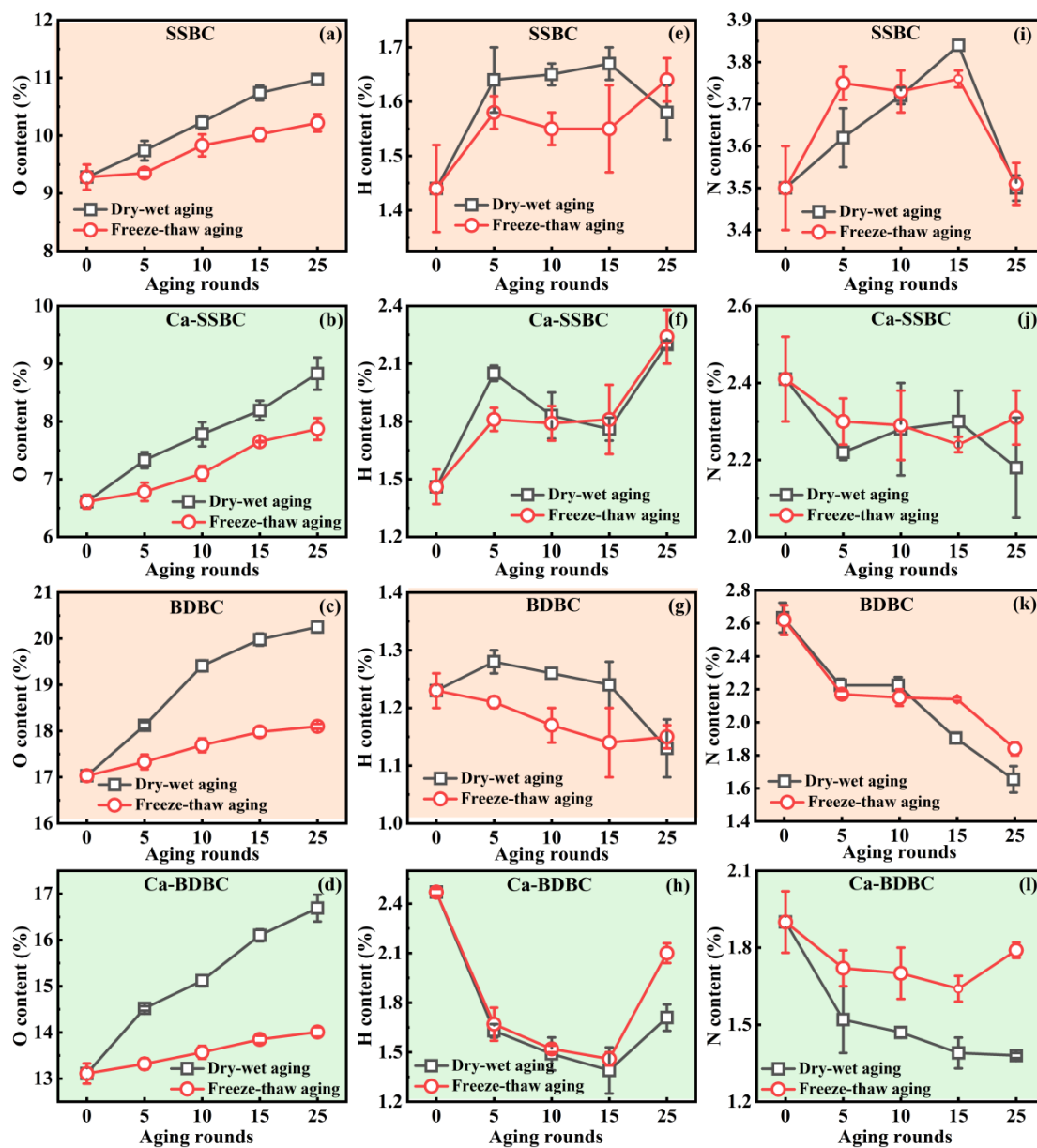


Figure S1. Variations of oxygen (O), hydrogen (H), and nitrogen (N) element contents in pristine biochar and Ca-rich biochar under different aging processes (n=3) (SSBC: sewage sludge biochar; BDBC: bone dreg biochar; Ca-SSBC: CaCl₂+sewage sludge biochar; Ca-BDBC: CaCl₂+bone dreg biochar)

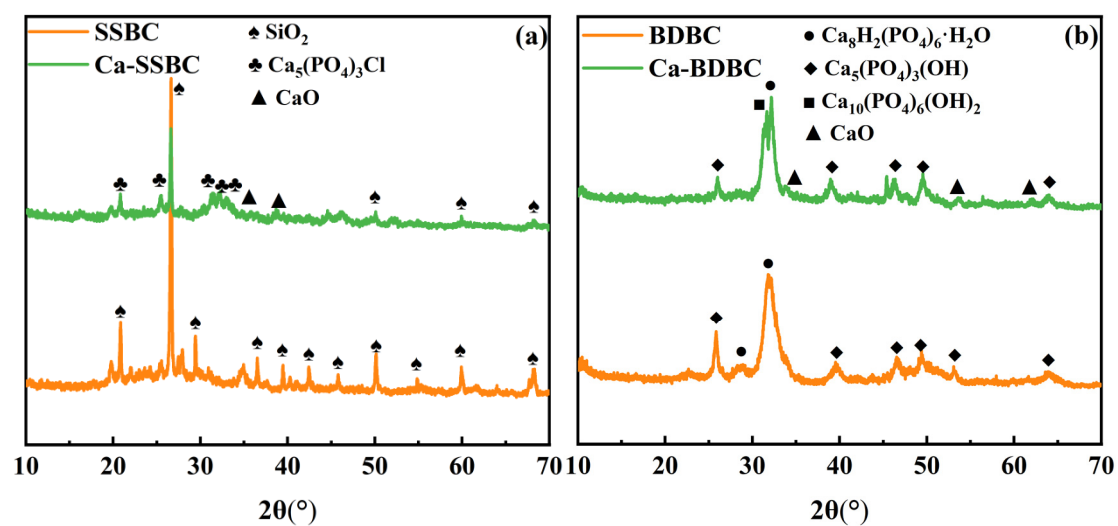


Figure S2. Surface crystals compositions of pristine biochar (SSBC: sewage sludge biochar; BDBC: bone dreg biochar) and Ca-rich biochar (Ca-SSBC: CaCl_2 +sewage sludge biochar; Ca-BDBC: CaCl_2 +bone dreg biochar).

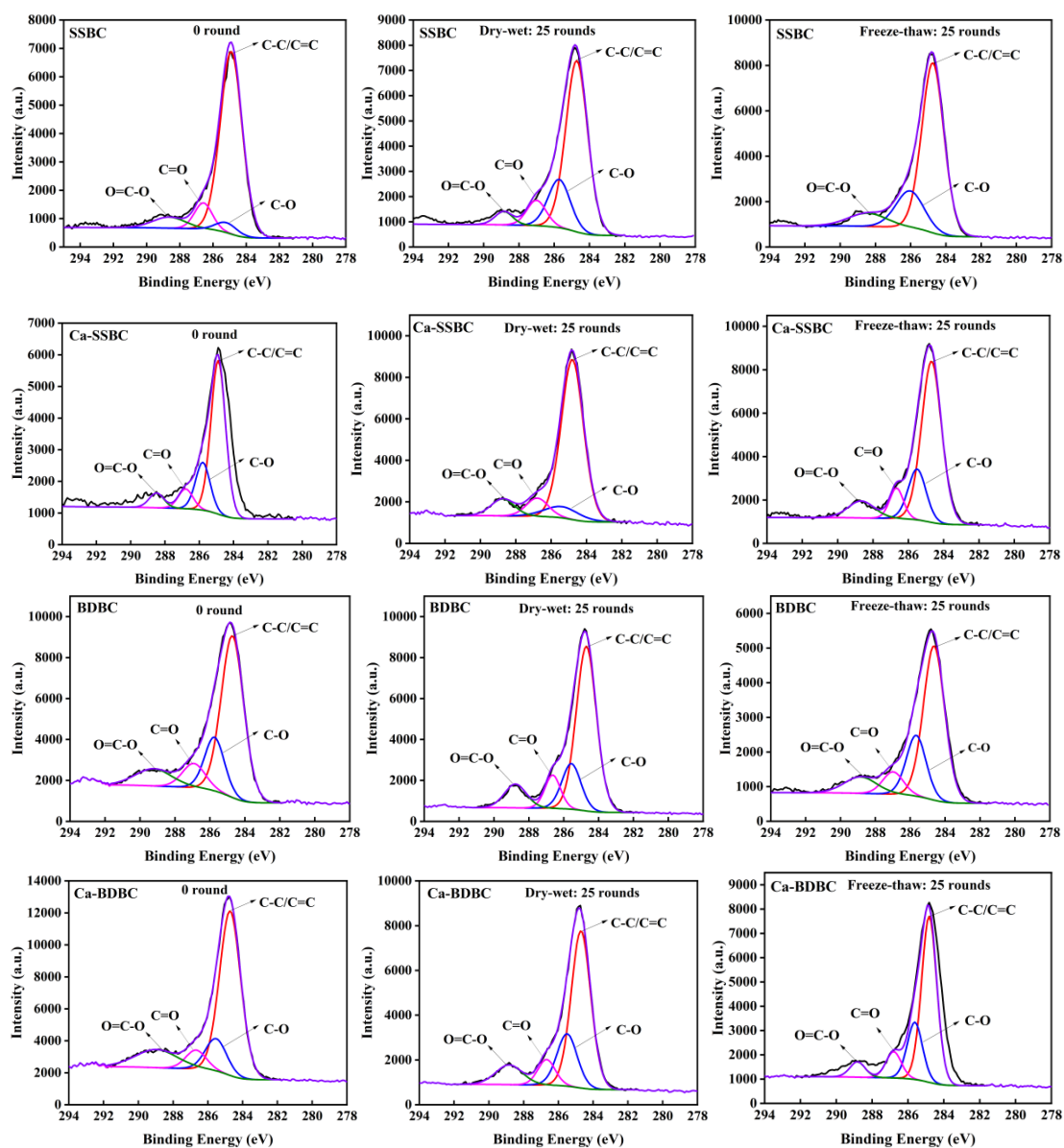


Figure S3. Surface carbon functional groups of pristine biochar and Ca-rich biochar with different aging processes (SSBC: sewage sludge biochar; BDBC: bone dreg biochar; Ca-SSBC: CaCl_2 +sewage sludge biochar; Ca-BDBC: CaCl_2 +bone dreg biochar)