

## Supporting Information

### **Mechanochemical destruction of a chlorinated polyfluorinated ether sulfonate (F-53B, a PFOS alternative) assisted by sodium persulfate**

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### **Text S1. Effect of different extraction ways on F-53B degradation**

It was reported that<sup>1, 2</sup> US and heat can accelerate the degradation of certain organic compounds in PS system, so we compared two different extraction ways of the milled samples (US + 60°C treatment, room temperature shaking without US), (see Figure S2 and Figure S3).

The extraction way of the “room temperature” one is all the same with the “US + 60°C” one except that the former one was extracted at room temperature without US treatment. The results (see Figure S1 and Figure S2) showed that the US + 60°C extraction had little influence on the degradation of F-53B.

### **Text S2. Effect of the mass of PS on F-53B degradation**

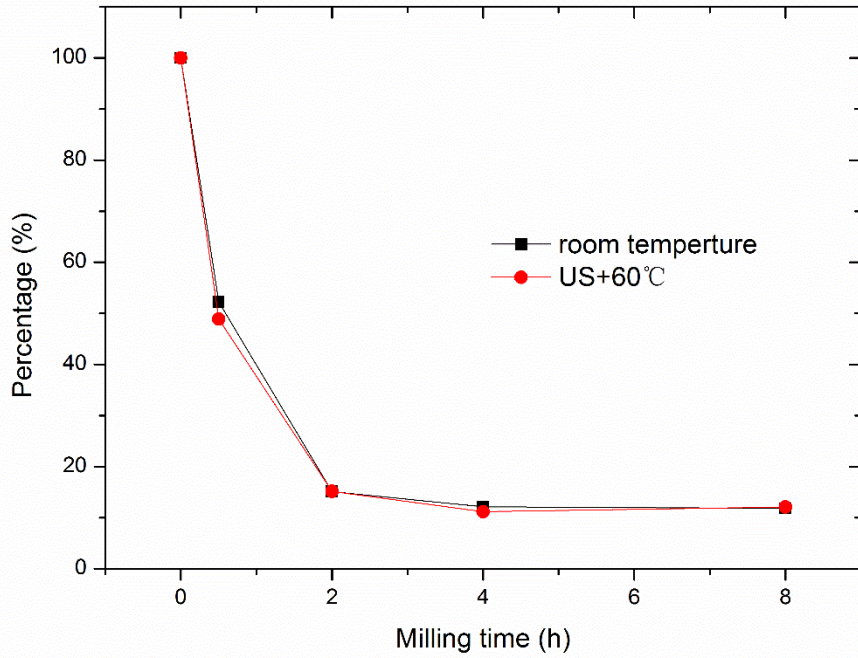
The mass of PS varied from 2.04 g to 5.21 g and the mass of NaOH was kept constant at 1.75 g. The results after 8 h milling were shown in Figure S3, similar to the results shown in Figure 2. When the mass of PS was low, there was almost no fluoride ion detected and the degradation of F-53B was only about 20%. Both the defluorination and degradation efficiencies increased with the increase of PS. Nevertheless, when we continue to increase the mass of PS (such as 5.21 g), the defluorination and degradation efficiencies started to decrease. This may be attributed to radical scavenging reaction (Eqs. (4)).

### **Text S3. Characterization of the separated solid residues**

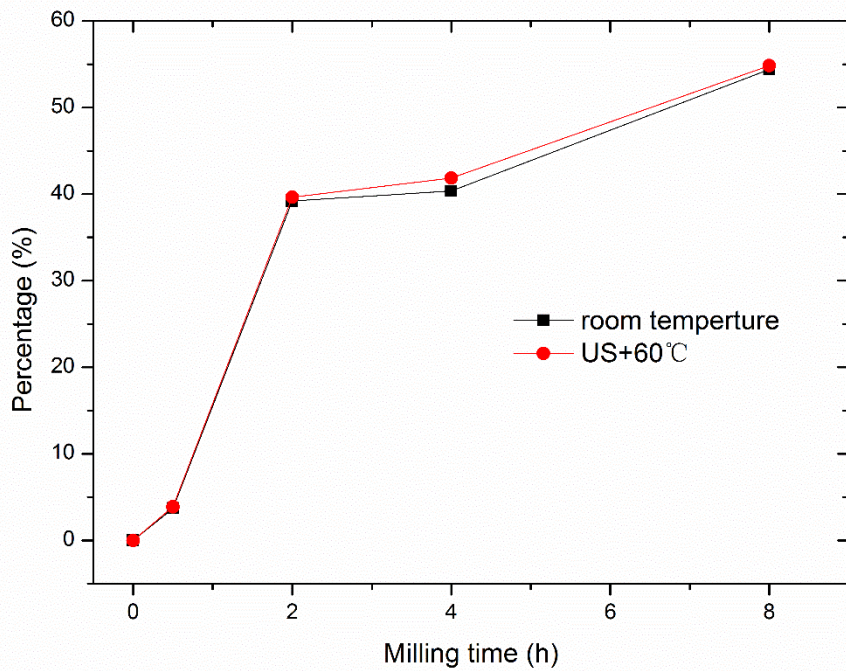
The separated undissolved solid residues from methanol solution were dried at 40°C before analysis.

### **Reference**

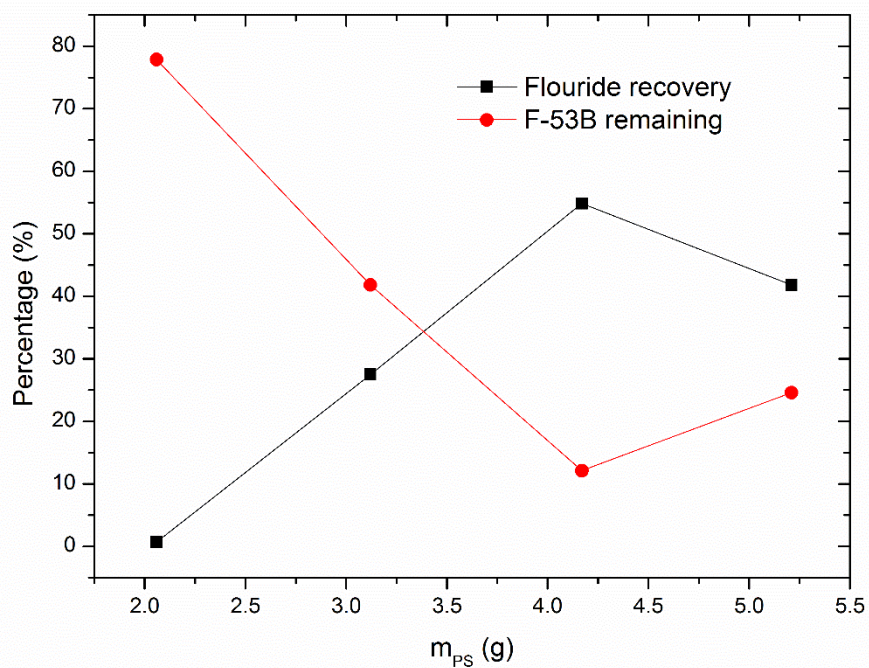
1. D. Zhao, X. Liao, X. Yan, S. G. Huling, T. Chai and H. Tao, *Journal of Hazardous Materials*, 2013, **254**, 228-235.
2. M. Kubota, M. Hayashi, H. Matsuda and H. Serizawa, *Journal of Material Cycles and Waste Management*, 2012, **14**, 132-138.



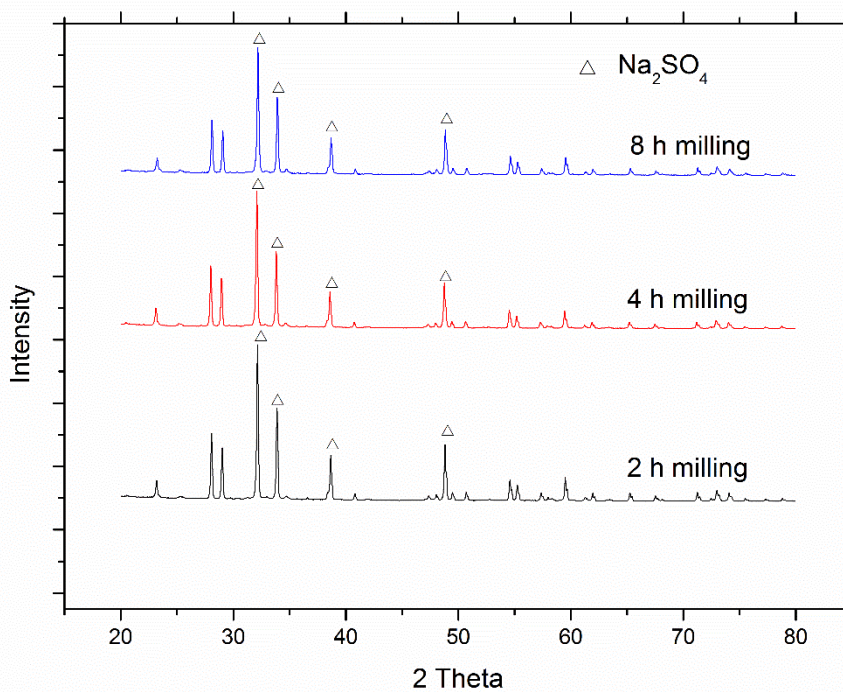
**Figure S1.** Effect of different extraction ways on the F-53B remaining



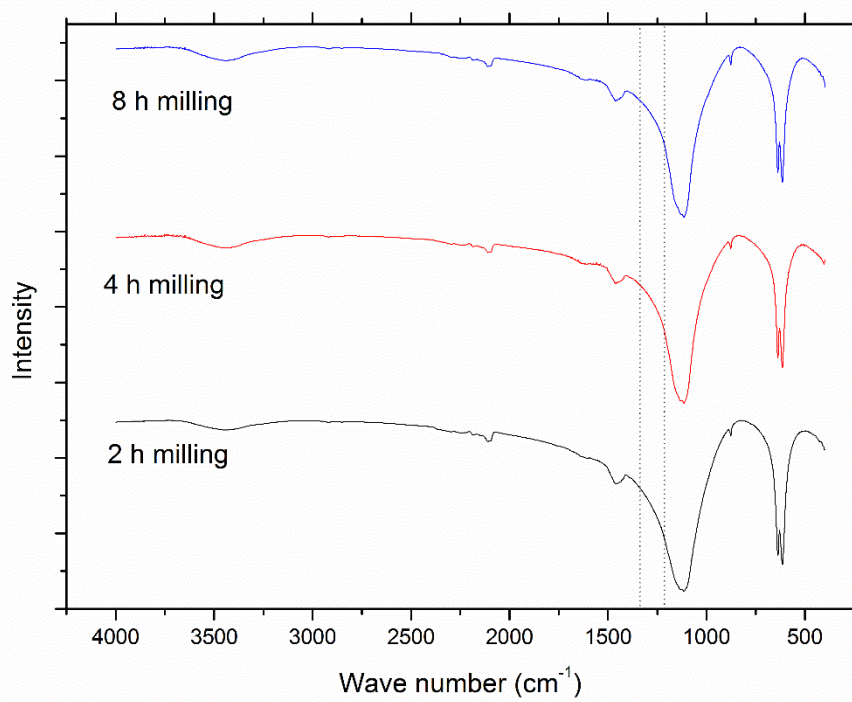
**Figure S2.** Effect of different extraction ways on the flouride recovery



**Figure S3.** Eight hours MC treatment of F-53B with different mass ratio of PS to NaOH (NaOH was kept constant at 1.75 g)



**Figure S4.** XRD spectra of separated solid residues at different milling time



**Figure S5.** FTIR spectra of separated solid residues at different milling time