Supplementary data
Effect of interactions of PVC and biomass components on formation of polycyclic aromatic hydrocarbons (PAH) during fast co-pyrolysis

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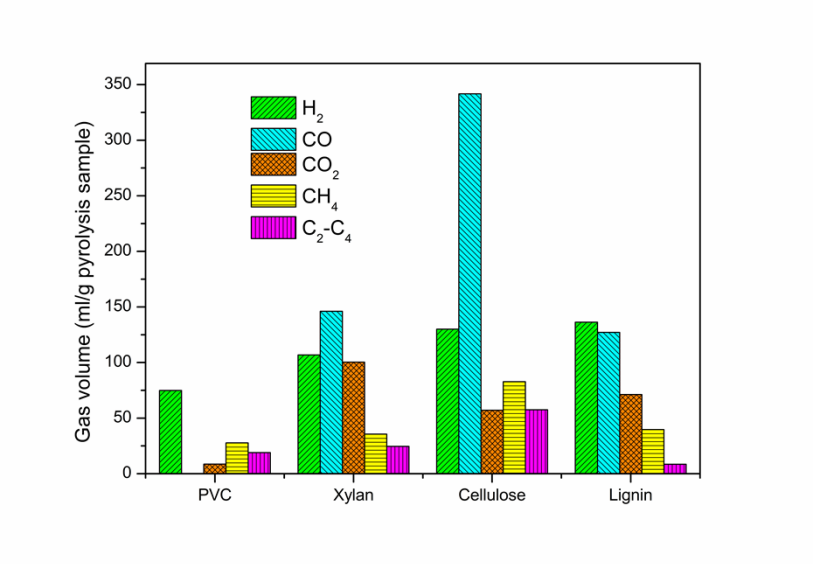

Fig. S1. Gas production from pyrolysis of single samples.

The gas production from the pyrolysis of the four samples (hemi-cellulose, cellulose, lignin, and PVC) is tested by GC (Fig. S1). At 800 °C, xylan, cellulose, and lignin produced similar H_2 yields (~100 ml/g sample). Cellulose produced the highest volume of CO (~350 ml/g sample), the high CO generation from cellulose pyrolysis was also reported by Banyasz et al (2001). CO was generated from C-O-C (Ferdous et al., 2002; Greenwood et al., 2002), which was abundant in the structure of cellulose. Xylan generated the most CO_2 (~150 ml/g sample), because of the –COO- unit in the monomer. Cellulose also generated the most CH_4 and C_2-C_4 (Fig. S1). The pyrolysis of PVC produced only a small amount of gas apart from HCl.

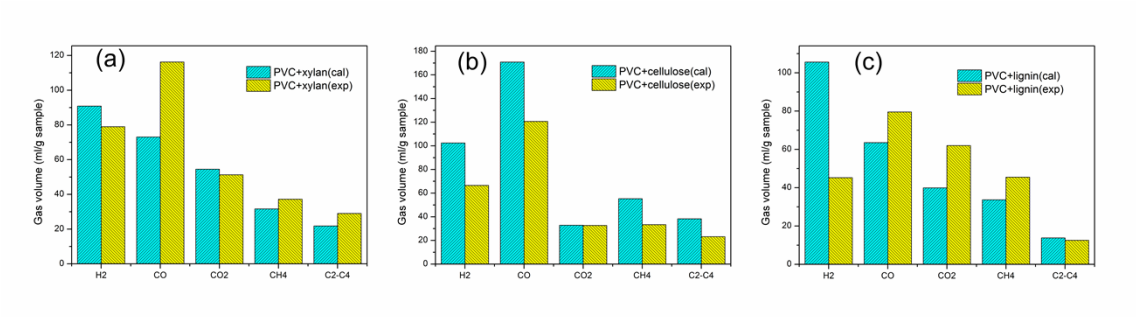

Fig. S2. Gas products of mixtures of PVC and biomass components (a, PVC+xylan; b, PVC+cellulose; c, PVC+lignin).

The ratio of PVC and biomass components is 1:1 (50%:50%). As shown in Fig. S2, experimental results (exp) were from the co-pyrolysis of PVC and biomass components; calculated results (cal) were from the superposition of the results of single components in the same weight percentage of real mixtures. The interaction effect of PVC and biomass components on gas products were complicated, as shown in Fig. S2. The interaction of PVC and biomass components decreased H_2 yield. The interaction of PVC and xylan or lignin increased CO yield, while the interaction of PVC and cellulose decreased CO yield. Meanwhile, CO_2 yield was increased from 39.9 to 62.0 ml g^{-1} sample due to the interaction of PVC and lignin.

References

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Greenwood, P.F., van Heemst, J.D.H., Guthrie, E.A., Hatcher, P.G., 2002. Laser micropyrolysis GC–MS of lignin. J. Anal. Appl. Pyrol. 62, 365-373.