Supplementary Information

Anaerobic digestion of cigarette butts: microbial community analysis and energy production estimation

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Number of pages: 6

Number of figures:4

Figure S1. The pictures of paper, leave, and filter after VS measurement. The photo shows the ash remaining after burning 6 g TS each at 550℃

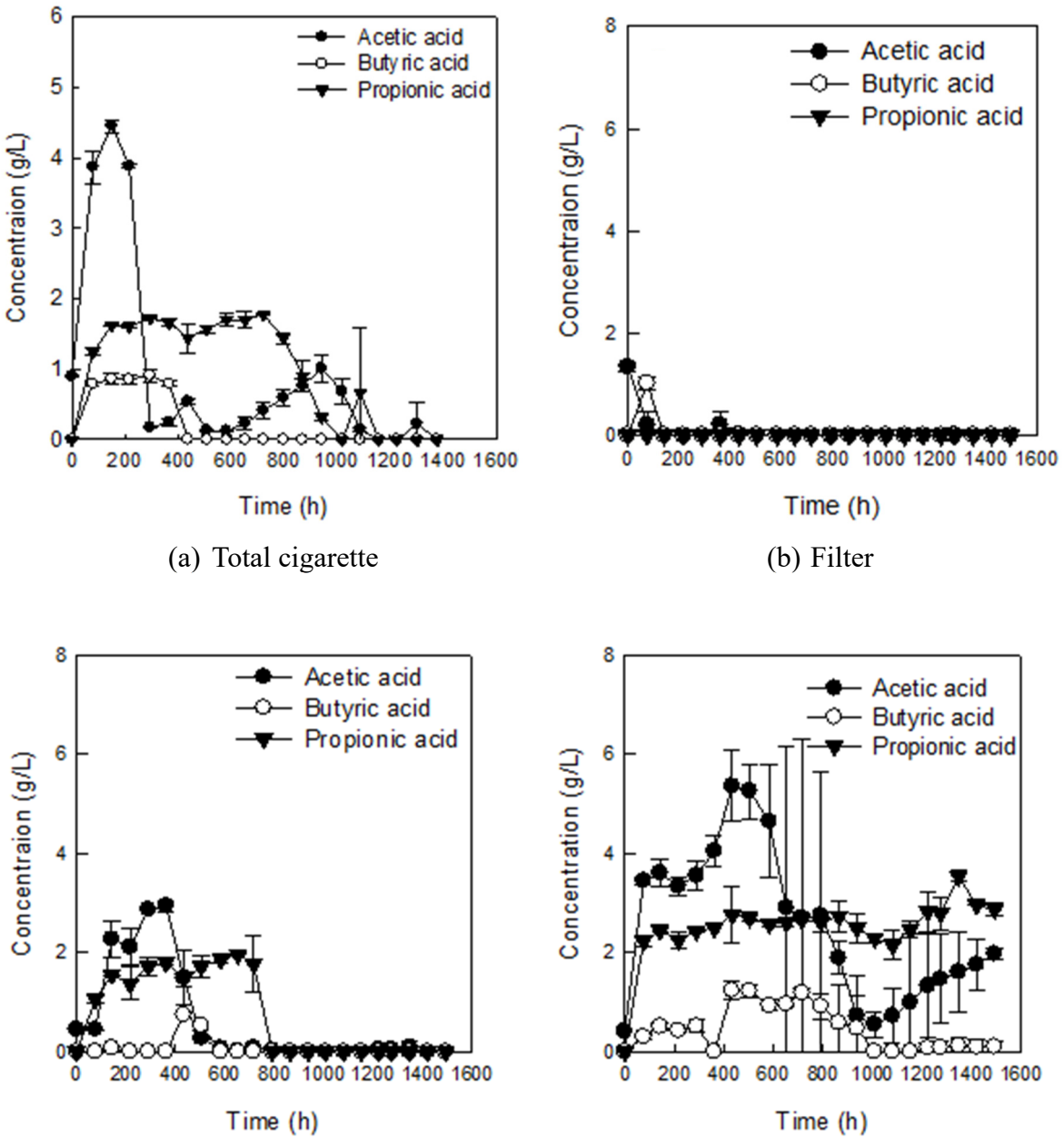
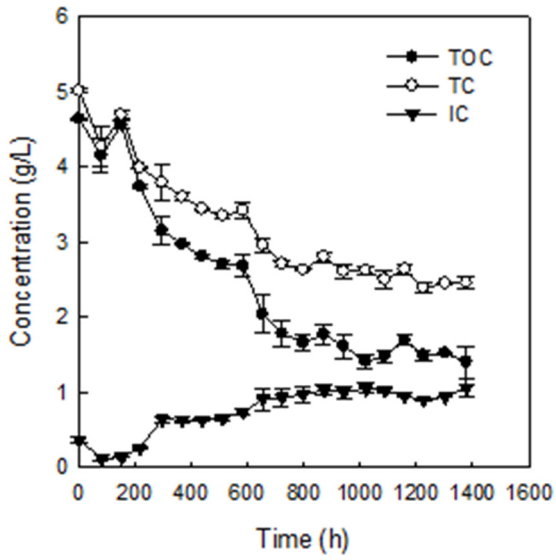
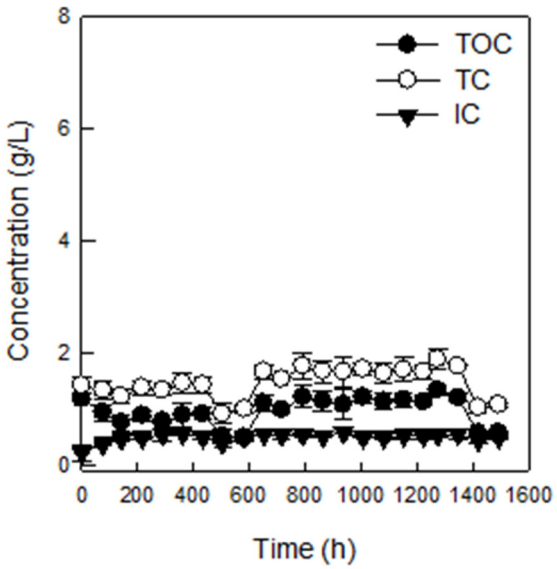


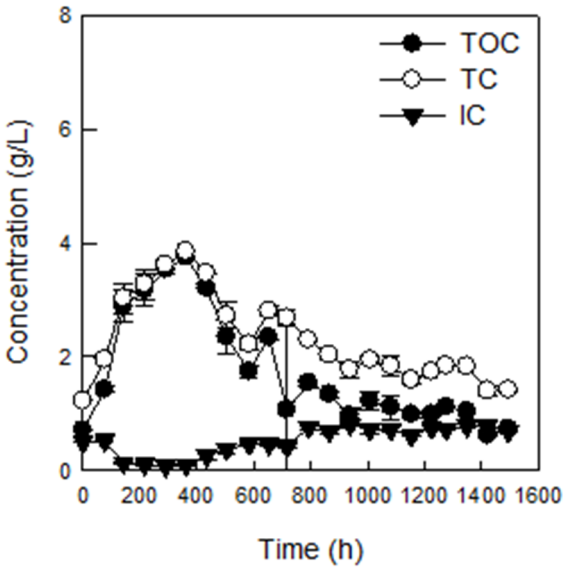
Figure S2. Time profile of volatile fatty acid concentrations with total CB or each component as a substrate for biochemical methane potential test.



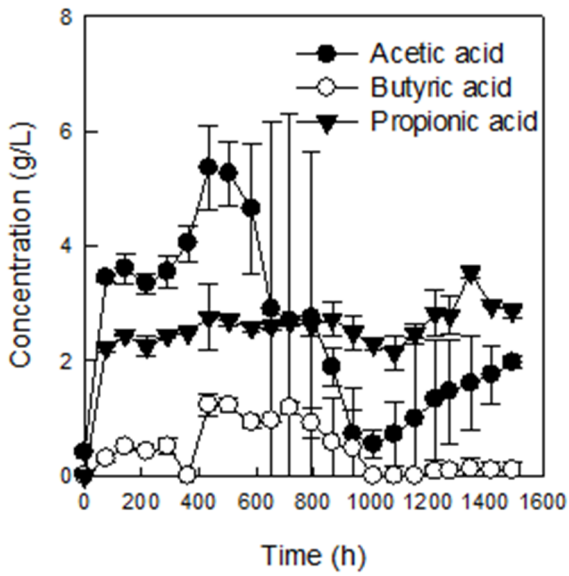
(a) Total cigarette



(b) Filter



(c) Paper



(d) Leave

Figure S3. Time profile of total carbon (TC), total organic carbon (TOC), and inorganic carbon (IC) with total CB or each component as a substrate for biochemical methane potential test.

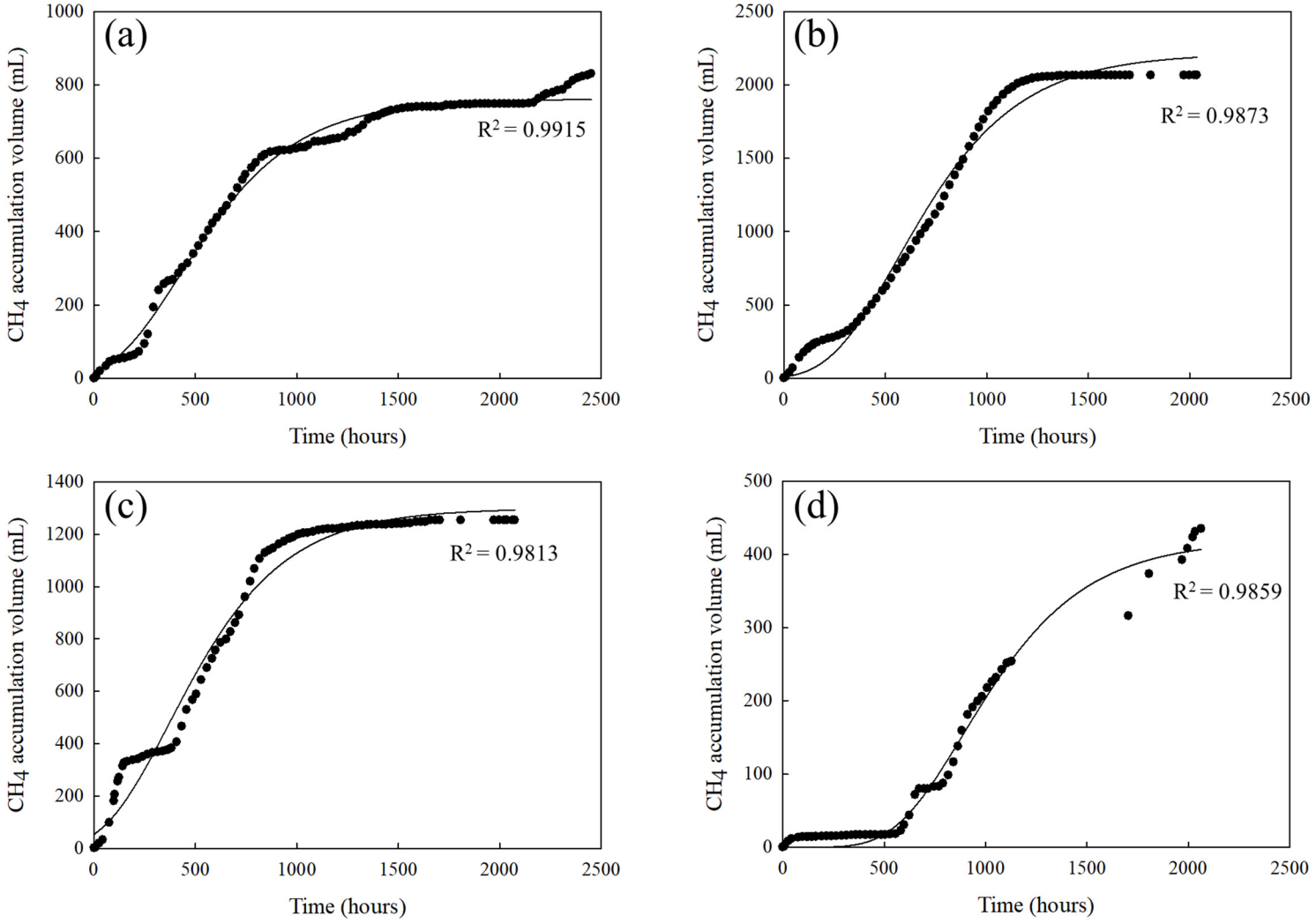


Figure S4. The modified Gompertz model depending on the kinds of substrates. It shows grinded tobacco (a), grinded filter (b), grinded paper (c), and grinded leaf (d). Spots show experimental values and lines indicate modeling predictions.

The calculation in Table 4

If 500 cigarette butts per day, the daily methane production is

$$40g\ filter \times \frac{443\ mL\ CH_4}{g\ TS_{filter}} + 10\ g\ paper \times \frac{259.7\ mL\ CH_4}{g\ TS_{paper}} + 20\ g\ leaf \times \frac{83.9\ mL\ CH_4}{g\ TS_{leaf}} = 22\ L\ CH_4/day$$

The coefficient to converting methane to energy used 9.4 Wh/L CH_4, then the electricity is

$$\frac{22\ L\ CH_4}{day} \times \frac{9.4\ Wh}{L\ CH_4} = 206.8\ Wh$$

If the electrical power required for the light bulb in the smoking room is 36W, the possible lighting time is

$$\frac{206.8\ Wh}{36\ W} = 5.7\ hr$$