Monitoring of Anaerobic Fermentation Process Using FT-IR Spectroscopy and Partial Least
Sqaure Method

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Efficiency of an anaerobic fermentation process (AFP) is strongly affected by the changes of compositions of substrates, intermediates and metabolites. Therefore, information on the concentrations of substrates and VFAs are critical for the successful operation of AFP. In this study, a monitoring technique exploiting FT-IR spectroscopy and partial least square (PLS) modeling approach was developed for the purpose of efficient monitoring of AFP. FT-IR spectra were used as PLS model input and HPLC analysis results for the concentrations of glucose, fructose and acetic and butyric acid were used as PLS model output. Spectral data pretreatment methods such ad baseline correction, OSC and auto-scaling were adopted. The regression coefficients ($R^2$) representing the accuracies of PLS models were always higher than 0.95 for the model calibration. Especially, $R^2$ value for acetic acid was high enough as 0.98 for the model validation.