**Real-time and on-line parallel detection of key fermentation process parameters by** **near-infrared** **spectroscopy in different environments**

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**Supplementary materials**

*1. NIR absorption signals of different wavelengths*



**Fig. S1.** Absorption signals of glucose in L-LA fermentation broth at NIR wavelengths



**Fig. S2.** Absorption signals of L-LA in L-LA fermentation broth at NIR wavelengths



**Fig. S3.** Absorption signals of glucose in SLs fermentation broth at NIR wavelengths



**Fig. S4.** Absorption signals of SLs in SLs fermentation broth at NIR wavelengths



**Fig. S5.** Absorption signals of oil in SLs fermentation broth at NIR wavelengths



**Fig. S6.** Absorption signals of glucose in SG fermentation broth at NIR wavelengths



**Fig. S7.** Absorption signals of SG in SG fermentation broth at NIR wavelengths



**Fig. S8.** Absorption signals of NH in SG fermentation broth at NIR wavelengths



**Fig. S9.** Absorption signals of NH4+ in SG fermentation broth at NIR wavelengths

*2. validation of model performance index*

**Table S1** Spectral validation of model performance index

|  |  |  |  |
| --- | --- | --- | --- |
|   | L-LA fermentation | SLs fermentation  | SG fermentation |
|  | Glu | L-LA | Glu | SLs | Oil | Glu | SG | NH4+ | P |
| RMSEP | 5.118 | 4.381 | 6.364 | 5.743 | 0.673 | 9.304 | 34.015 | 0.107 | 0.102 |
| R2 | 0.99 | 0.95 | 0.92 | 0.98 | 0.98 | 0.97 | 0.80 | 0.90 | 0.95 |