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

Chen Yanga, Chen Linglia, Guo Meijina, Li Xua\*, Zeng Weib, Chen Zhongbingc, Tian Xiweia\*, Chu Jua, Zhuang Yingpinga,d

a *State Key Laboratory of Bioreactor Engineering, East China University of Science and Technology, Shanghai 200237, China,*

b*Yidu HEC Biochem. Co. Ltd., Hubei 443300, PR China,*

c*Zhejiang Biok Co.Ltd, Zhongguan Industrial Park, Zhejiang, PR China,*

d Frontiers Science Center for Materiobiology and Dynamic Chemistry*, East China University of Science and Technology, Shanghai 200237, China*

*\*Author for correspondence*

*Address:*

*Xiwei Tian, Xu Li*

*State Key Laboratory of Bioreactor Engineering, East China University of Science and Technology*

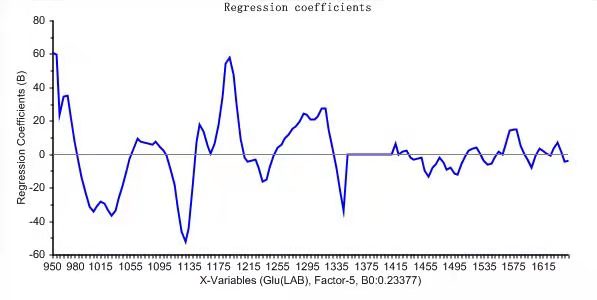
*P.O. box 329, 130 Meilong Road, Shanghai 200237, People’s Republic of China*

*Tel:* *+86-21-64253021; Tel: +**86-21-64253853*

*E-mail address: tahfy@163.com (Xiwei Tian), xli@ecust.edu.cn (Xu L)*

**Supplementary materials**

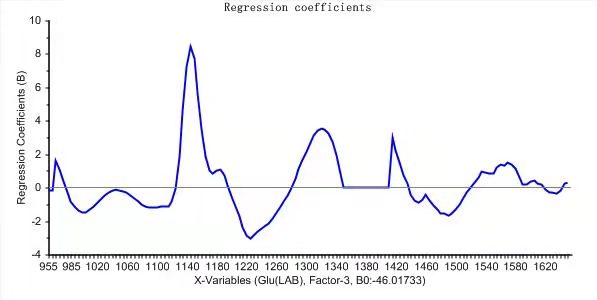
*1. NIR absorption signals of different wavelengths*



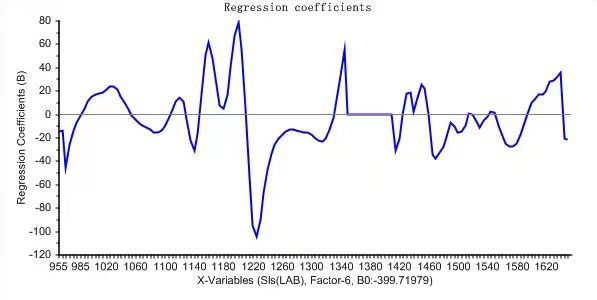
**Fig. S1.** Absorption signals of glucose in L-LA fermentation broth at NIR wavelengths



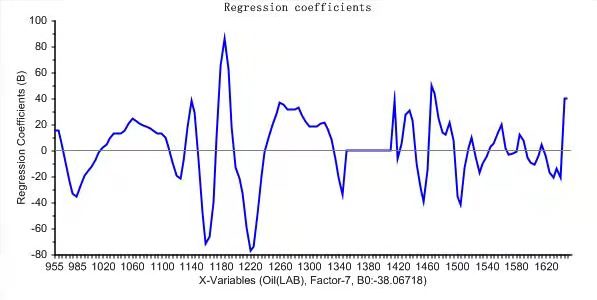
**Fig. S2.** Absorption signals of L-LA in L-LA fermentation broth at NIR wavelengths



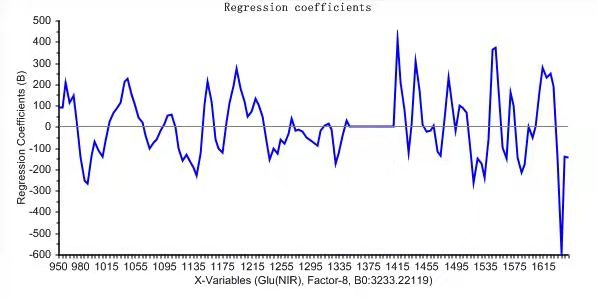
**Fig. S3.** Absorption signals of glucose in SLs fermentation broth at NIR wavelengths



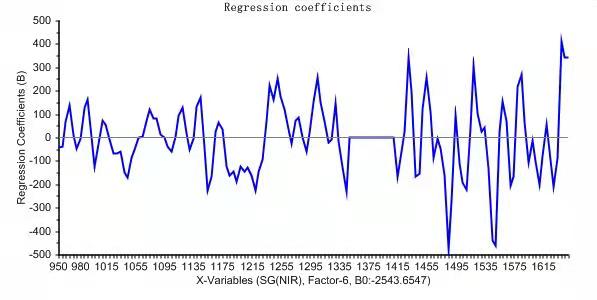
**Fig. S4.** Absorption signals of SLs in SLs fermentation broth at NIR wavelengths



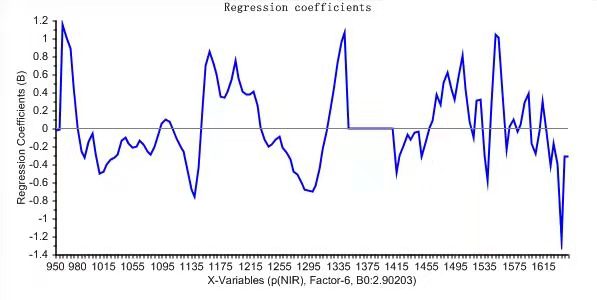
**Fig. S5.** Absorption signals of oil in SLs fermentation broth at NIR wavelengths



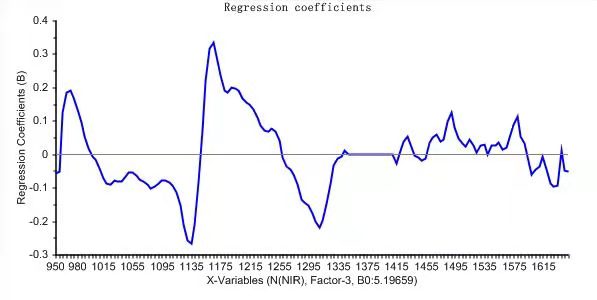
**Fig. S6.** Absorption signals of glucose in SG fermentation broth at NIR wavelengths



**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 |