

## SUPPLEMENTAL MATERIAL FOR:

### **D-methionine and D-phenylalanine improve *Lactococcus lactis* F44 acid resistance and nisin yield by governing cell wall remodeling**

Hao Wu<sup>a,b,1</sup>, Ershu Xue<sup>a,b,1</sup>, Ning Zhi<sup>a,b</sup>, Qianqian Song<sup>a,b</sup>, Kairen Tian<sup>a,b</sup>, Qinggele Caiyin<sup>a,b</sup>, Lin Yuan<sup>a</sup>, Jianjun Qiao<sup>a,b,c,\*</sup>

<sup>a</sup>Department of Pharmaceutical Engineering, School of Chemical Engineering and Technology, Tianjin University, Tianjin, China;

<sup>b</sup>Key Laboratory of Systems Bioengineering, Ministry of Education, Tianjin, China;

<sup>c</sup>SynBio Research Platform, Collaborative Innovation Center of Chemical Science and Engineering, Tianjin, China

<sup>1</sup>These authors contributed equally to this work.

\*Corresponding author

E-mail: [jianjunq@tju.edu.cn](mailto:jianjunq@tju.edu.cn) (JQ)

## CONTENTS:

**Fig. S1** The biomass of *L. lactis* F44 with exogenously adding 19 diverse D-amino acids.

**Fig. S2** The pH of *L. lactis* F44 with exogenously adding 19 diverse D-amino acids.

**Fig. S3** The nisin yield of *L. lactis* F44 with exogenously adding 17 diverse D-amino acids.

**Fig. S4** Determination of the tolerance concentration of *L. lactis* F44 against Van-FL.

**Fig. S5** The physiological characters of *L. lactis* F44, F44-pLEB124, F44-murF, and F44-ddl.

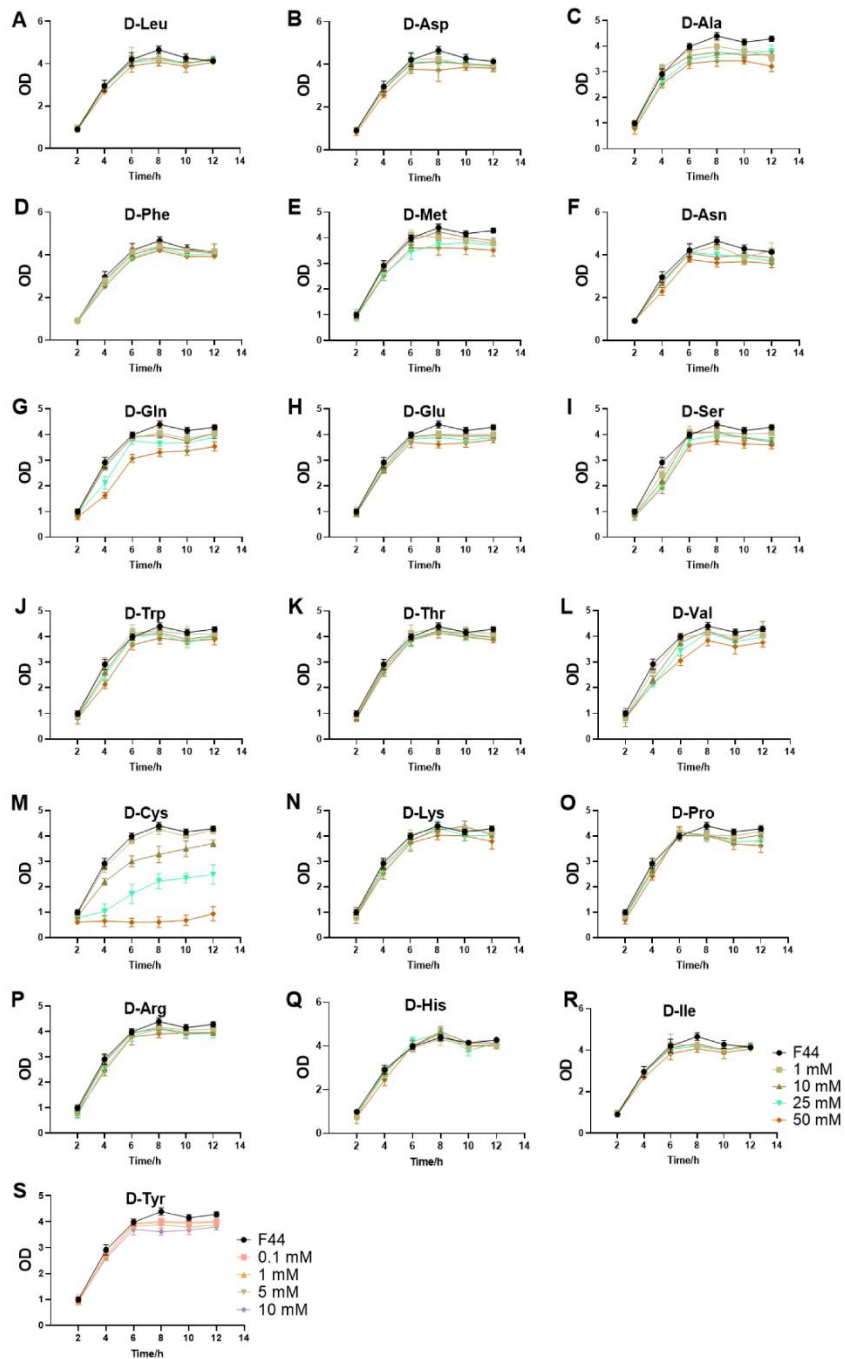


Fig. S1 The biomass of *L. lactis* F44 with exogenously adding 19 diverse D-amino acids.

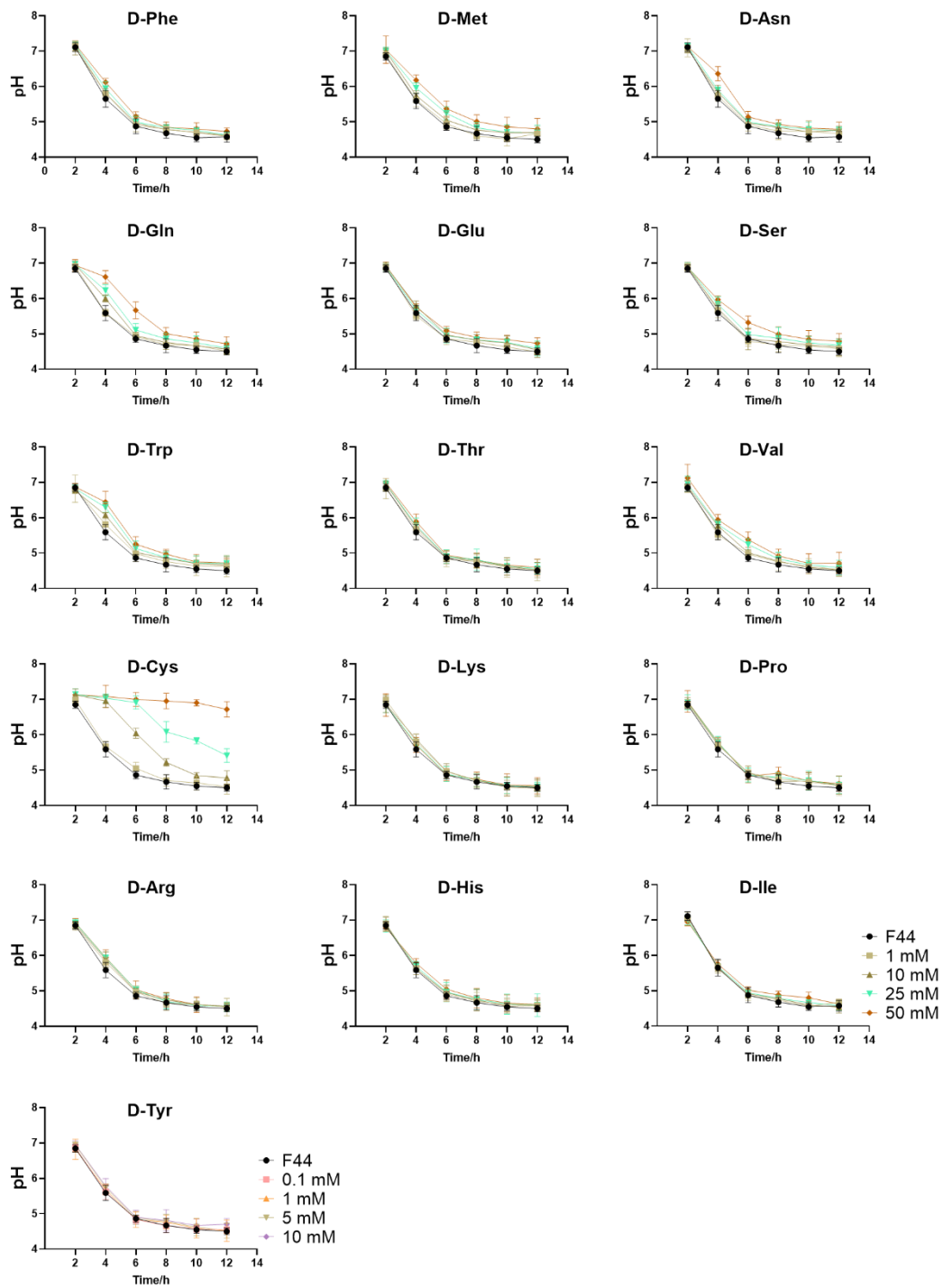


Fig. S2 The pH of *L. lactis* F44 with exogenously adding 19 diverse D-amino acids.

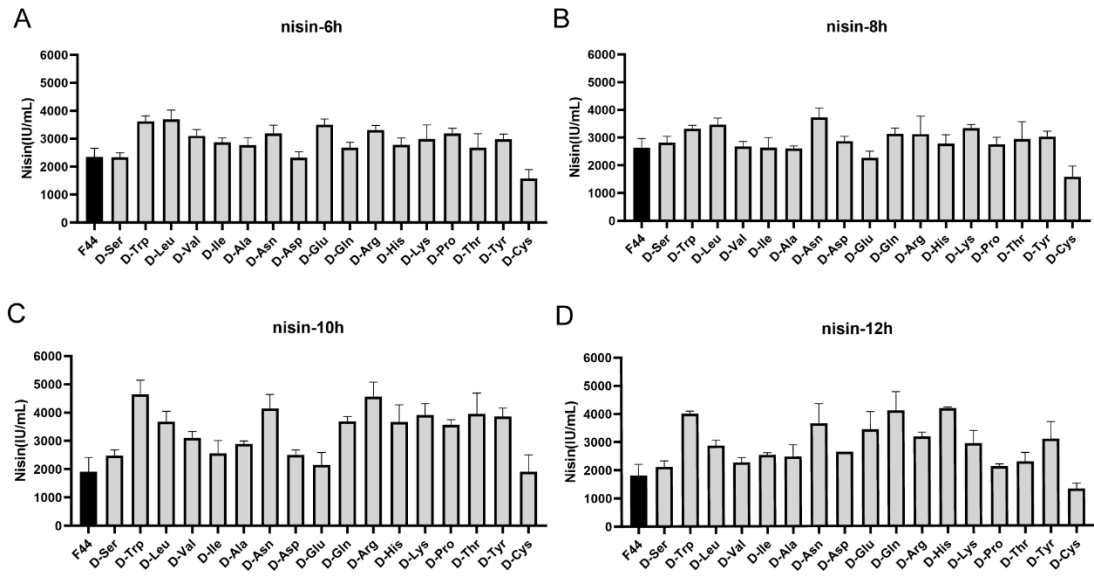


Fig. S3 The nisin yield of *L. lactis* F44 with exogenously adding 17 diverse D-amino acids.

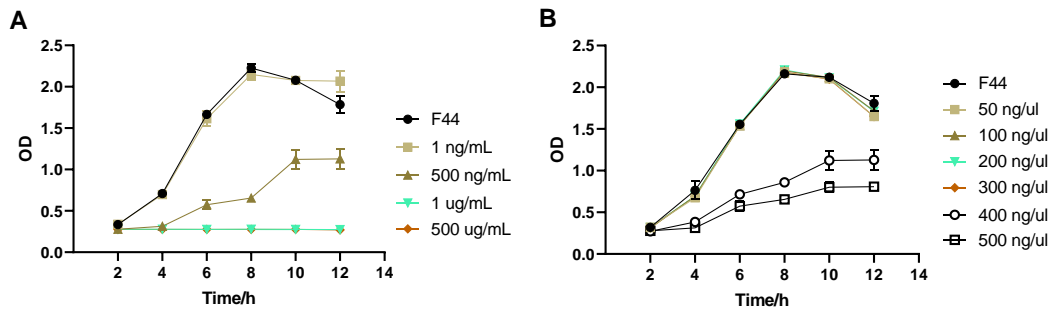
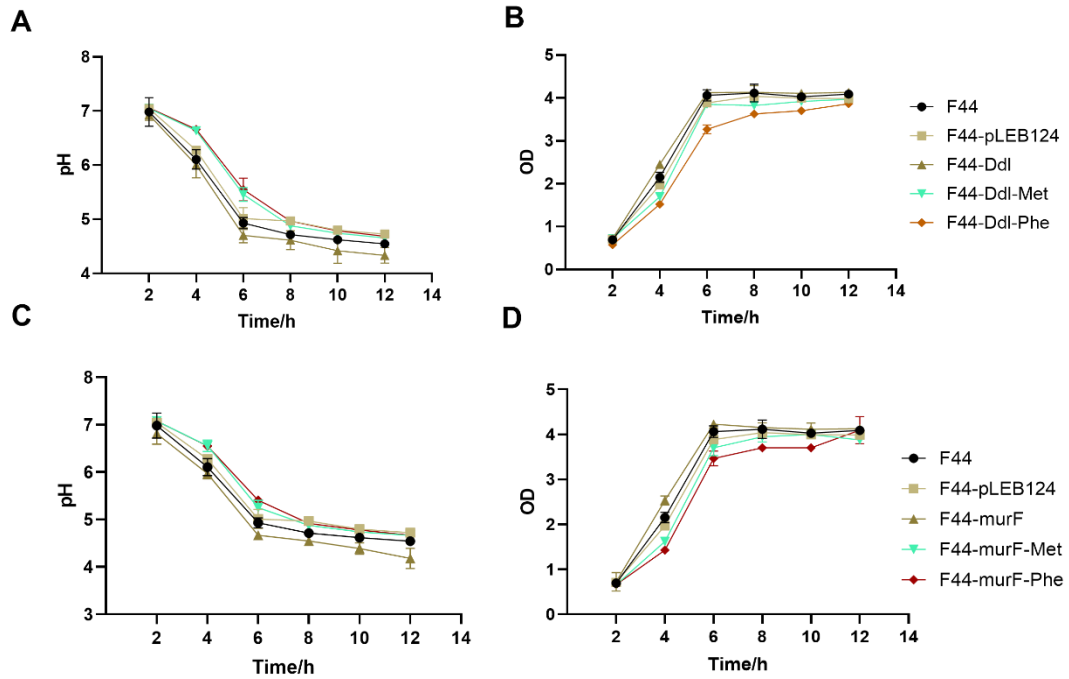


Fig. S4 Determination of the tolerance concentration of *L. lactis* F44 against Van-FL.



**Fig.S5 The physiological characters of *L. lactis* F44, F44-pLEB124, F44-murF, and F44-ddl.** F44-murF and F44-ddl represent *murF* and *ddl* over-expressing strains. *L. lactis* F44 represents wild-type strain. F44-pLEB124 represents F44 contains an empty plasmid. F44-ddl-Met, F44-ddl-Phe, F44-murF-Met, and F44-murF-Phe represent F44-ddl or F44-murF strain with adding D-Met or D-Phe.