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Cell-surface engineering of *Saccharomyces cerevisiae* for cellulosic biorefinery

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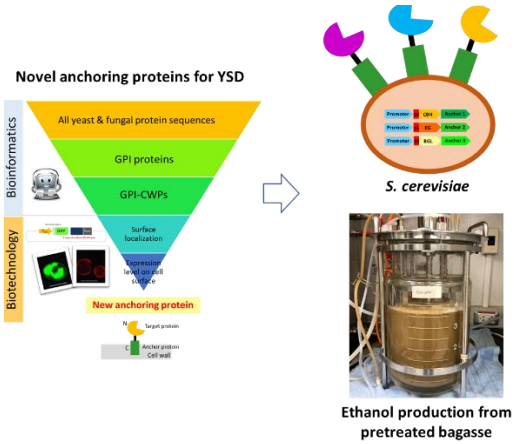
Abstract: Lignocellulosic biomass has been considered as a sustainable substrate for production of biofuels and value-added chemicals. However, efficient degradation of recalcitrance lignocellulosic substrate requires the large amount of cellulolytic enzymes and other biomass-degrading enzymes. Yeast cell surface display (YSD) technology that expresses protein of interest on the yeast cell surface is one of promising strategy for development a whole-cell biocatalyst for direct ethanol production from cellulosic biomass. This research focuses on the establishment of novel anchoring protein motif required for incorporation of target protein into the yeast cell surface. Five novel anchoring proteins were successfully identified with superior performance compared to the existing anchoring protein namely α-agglutinin. To further improve the display efficiency, the source of cellulase genes suitable to be displayed on the yeast cell wall and overexpression of genes encoding glycosylphosphatidylinositol biosynthesis and remodeling proteins were investigated. These optimized gene cassettes were introduced into a thermotolerant diploid *S. cerevisiae* strain via sequential transformation approach. Therefore, the recombinant yeast strain developed in this study can be applied for economic ethanol production from cellulosic substrates.

Graphical abstract:



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Keywords: Cell surface display; Anchoring protein; Yeast; Cellulase; Ethanol; Consolidated bioprocessing

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