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(57) Abstract :

The invention discloses an engineered yeast strain (1) designed for sustainable biofuel production through enhanced ethanol synthesis. The strain utilizes lignocellulosic biomass (2) by integrating modified sugar transporters (5, 6, 7), redox balancing modules (10–12), and stress resistance mechanisms (13–17). Ethanol pathway optimizations (18–20) improve productivity, while nutrient efficiency (22) and CRISPR-based stability (21) ensure cost-effective, long-term performance. Experimental validation confirms robust operation in industrial conditions, demonstrating significant potential for replacing fossil fuels with eco-friendly biofuels.

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