

AI-Designed Enzymes Build Antibiotics Faster

New biocatalytic method skips traditional synthesis with chiral oxazolidinones.

Direct enantioselective synthesis

Reaction Efficiency

The new method enables direct synthesis of chiral oxazolidinones from unactivated alkenes, bypassing multi-step chiral pool strategies.

This breakthrough eliminates the need for pre-synthesized enantiopure amino alcohols, a major bottleneck in pharmaceutical and materials synthesis. The haemprotein-catalyzed aziridination/ring-expansion cascade achieves high enantioselectivity without requiring conjugated substrates. This advances the frontier of AI-guided enzyme design toward complex, non-activated molecular transformations.

01

AI Can Engineer Enzymes for Unactivated Substrates

The study demonstrates that AI-optimized haemproteins can catalyze reactions on unactivated alkenes — a reactivity previously limited to conjugated systems like styrenes. This expands the scope of biocatalytic design beyond traditional chemical constraints. In commercial space and aviation, this implies that AI can now be used to engineer enzymes that synthesize high-performance, lightweight materials from simple, stable feedstocks — reducing reliance on rare or toxic reagents.

02

Directed Evolution Meets AI in Molecular Design

The research identifies key mutations introduced via directed evolution that enable enantioselective formation. These mutations were not predictable by classical models, underscoring the need for AI to interpret complex evolutionary pathways. For AI in aviation and space, this means that machine learning models trained on evolutionary data can now predict and optimize molecular scaffolds for extreme environments — such as heat-resistant coatings or self-healing polymers — where traditional synthesis fails.

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