Engineered Phosphite Dehydrogenases for Recycling Orthogonal Noncanonical Cofactors

Tech ID: 34535 / UC Case 2025-845-0

BRIEF DESCRIPTION

Engineered phosphite dehydrogenases enable efficient recycling of noncanonical redox cofactors for sustainable biomanufacturing.

FULL DESCRIPTION

Researchers at UC Irvine engineered phosphite dehydrogenase (PTDH) enzymes to recycle noncanonical redox cofactors (NRCs) with high specificity and efficiency. Using a high-throughput evolution platform, they identified PTDH variants that minimally interfere with native NAD(P)H-dependent redox processes, enabling precise delivery of reducing power to target biotransformations. This approach leverages low-cost phosphite as an electron donor, validated by successful production of a pharmaceutical intermediate in both whole cells and lysates.

SUGGESTED USES

- Sustainable and economical biomanufacturing of pharmaceuticals and fine chemicals.
- Development of orthogonal enzymatic pathways for synthetic biology.
- Biocatalyst development for industrial biotransformations.
- High-throughput enzyme engineering platforms.

ADVANTAGES

- High specificity and efficiency in recycling orthogonal noncanonical redox cofactors.
- Cost-effective use of phosphite as an electron source.
- Reduced metabolic crosstalk by silencing native NAD(P)H pathways.
- Enables precise control of redox reactions in vivo and in vitro.

PATENT STATUS

Patent Pending

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OTHER INFORMATION

CATEGORIZED AS

- **Materials & Chemicals**
  - Biological
  - Chemicals
- **Medical**
  - New Chemical Entities, Drug Leads
- **Research Tools**
  - Screening Assays

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