Orthogonal Redox Cofactor for Enhanced Biomanufacturing Flexibility

Tech ID: 34020 / UC Case 2024-997-0

BRIEF DESCRIPTION

Introducing a groundbreaking orthogonal redox cofactor, NMN+, to revolutionize redox reaction control in biomanufacturing.

FULL DESCRIPTION

This technology establishes nicotinamide mononucleotide (NMN+) as a noncanonical, orthogonal redox cofactor, alongside engineered enzymes, to precisely modulate redox reactions independent of natural metabolic pathways. This innovative approach enables the manipulation of NMNH:NMN+ ratios, facilitating the production of high-purity chemicals, such as stereo-pure 2,3-butanediol, in both cell-free systems and live E. coli cells, without interference from traditional redox systems.

SUGGESTED USES

- Biomanufacturing of renewable chemicals and biofuels.
- Production of stereo-pure pharmaceuticals and fine chemicals.
- Development of cell-free synthetic biochemistry platforms.
- Enhanced metabolic engineering for improved yield, titer, and productivity of bioproducts.
- Customizable biocatalyst design for a wide range of industrial applications.

ADVANTAGES

- Enables precise control of redox reaction directions, decoupled from natural metabolic processes.
- Facilitates the production of high-purity, stereo-specific biochemicals.
- Offers a cost-effective alternative to traditional cofactors with enhanced stability and efficiency.
- Supports the development of orthogonal metabolic systems for improved biomanufacturing processes.
- Potential to vastly expand the range of bio-manufacturable products through flexible, efficient redox control.

PATENT STATUS

Patent Pending

RELATED MATERIALS

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OTHER INFORMATION

CATEGORIZED AS

- **Biotechnology**
  - Industrial/ Energy
- **Energy**
  - Bioenergy
- **Materials & Chemicals**
  - Biological
  - Chemicals
- **Research Tools**
  - Expression System
- **Engineering**
  - Other

RELATED CASES

2024-997-0

» Aspacio, D., et al. Li, H. (2024). Shifting redox reaction equilibria on demand using an orthogonal redox cofactor. Nat. Chem. Biol. 20.

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