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## 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

Country	Type	Number	Dated	Case
Patent Cooperation Treaty	Published Application	2025/245512	11/27/2025	2024-997

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### OTHER INFORMATION

### CATEGORIZED AS

- » [Biotechnology](#)
- » [Industrial/ Energy](#)
- » [Energy](#)
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- » [Research Tools](#)
  - » [Expression System](#)
- » [Engineering](#)
  - » [Other](#)

### RELATED CASES

2024-997-0

## RELATED MATERIALS

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

## UCI Beall Applied Innovation

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