THIOPHOSPHORODICHLORIDATE REAGENTS FOR CHEMOSELECTIVE HISTIDINE BIOCONJUGATION

Tech ID: 29856 / UC Case 2019-047-0

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	12,145,964	11/19/2024	2019-047

BRIEF DESCRIPTION

Modifying proteins with chemical labels—such as fluorescent dyes, drugs, or tracking tags—is an essential technique in chemical biology and biopharmaceutical development. However, selectively modifying one specific type of amino acid without affecting others on a complex protein surface remains a significant chemical challenge. To solve this, UC Berkeley researchers have developed a method for the site-specific labeling of proteins using thiophosphorodichloridate reagents. These specialized chemical reagents are engineered to achieve high chemoselective conjugation specifically with histidine residues under mild biological conditions. By targeting the unique chemical properties of histidine, the reagents form a stable covalent bond that links the desired functional label to the protein. This breakthrough provides scientists with a precise tool for modifying biomolecules, which is crucial for creating well-defined therapeutics and advanced diagnostic imaging agents.

SUGGESTED USES

» Antibody-Drug Conjugates: Attaching potent cytotoxic drugs to targeted antibodies at precise locations to create highly effective, uniform cancer therapies.

» Fluorescent Protein Labeling: Conjugating fluorescent tags to proteins to visualize their distribution, movement, and interactions within living cells.

» Biomedical Imaging Probes: Linking radioactive elements or contrast agents to protein scaffolds for advanced diagnostic imaging techniques like positron emission tomography.

» Surface Immobilization: Attaching proteins to microarrays, biosensors, or diagnostic chips in a controlled orientation to preserve their biological activity.

» Mechanistic Biology Studies: Modulating protein function or locking specific conformations by strategically placing chemical modifiers on surface-accessible histidine residues.

ADVANTAGES

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INVENTORS

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OTHER INFORMATION

CATEGORIZED AS

» **Biotechnology**
» Health
» Other
» **Materials & Chemicals**
» Chemicals
» Other
» **Research Tools**

RELATED CASES

2019-047-0

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High Chemical Selectivity: Targets histidine residues with exceptional precision, preventing unwanted cross-reactions with other nucleophilic amino acids like lysine or cysteine.

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Biocompatible Reaction Conditions: Proceeds smoothly under mild aqueous conditions at physiological temperature and acidity, protecting the delicate structure and function of the protein.

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Stable Bond Formation: Formulates a robust covalent linkage that resists degradation, ensuring the attached label remains securely bound during complex biological assays.

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Broad Reagent Versatility: The thiophosphorodichloridate core can be modified to carry a wide variety of functional payloads, including drugs, polymers, biotin, or fluorophores.

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Streamlined Purification: High chemical efficiency reduces the formation of incomplete reaction byproducts, simplifying the purification of the final modified protein.

RELATED MATERIALS

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- Puromycin Activity-Based Sensing Probes For Molecular Imaging And Histochemistry
- Activity-Based Ratiometric FRET Probe Detects the Changes in Labile Copper Pools
- Homoallylamines As Formaldehyde-Responsive Triggers With Imaging Applications
- Diagnostic Colorimetric Assay
- Tandem Activity-Based Sensing and Labeling Strategy for Reactive Oxygen Species Imaging
- Fluorescent Probe for Selective Imaging of Carbon Monoxide in Living Cells Using Palladium-Mediated Carbonylation

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