SYNTHETIC COMPOUND FOR QUADRICYCLANE LABELING OF MULTIPLE BIOMOLECULES WITHOUT DISRUPTING LIVING SYSTEMS

Tech ID: 21890 / UC Case 2012-014-0

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	9,556,195	01/31/2017	2012-014

BRIEF DESCRIPTION

Bioorthogonal chemistry is a challenging frontier in synthetic biological research with specific boundaries in water stability, biocompatibility and reaction kinetics under physiological conditions. The multiplexed analysis of several biomolecules in a given system requires parallel use of a collection of bioorthogonal reactions. Current toolkits are limited by conventional synthetic transformations.

Scientists at UC Berkeley have synthesized a Ni bis(dithiolene) species as reactive partner to quadricyclane to detect biomolecule labeling. The quadricyclane ligation offers a new class of reactivity for bioorthogonal reagents in multiplexed labeling experiments.

On the one hand, current reactive groups for bioorthogonal reactions are large and/or not stable enough for metabolic incorporation into biomolecules. Quadricyclane's small molecular size and limited reactivity with native biomolecules, alkenes, alkynes and cyclooctynes render it attractive for metabolic incorporation into biomolecules. On the other hand, limitations of quadricyclane ligation hinges on redox stability of the Ni bis(dithiolene) reagents and photostability of the ligation product. The Ni bis(dithiolene) compound developed at UC Berkeley entirely prevents photodegradation, subsequently allowing live cells to be treated without any apparent toxicity at mM concentrations.

SUGGESTED USES

- Biomolecular research – macromolecule functionalization, antibody conjugation, protein PEGylation
- Synthetic chemistry – crosslinking of polymers and proteins, surface modification
- Biomedical applications – multiplexed biomolecule imaging, targeted drug delivery

ADVANTAGES

- Multiplexed analysis of several differentially tagged biomolecules in biological system
- Enables metabolic incorporation into biomolecules
- Prevents reduction in Ni bis(dithiolene) reagent by eliminating photodegradation
- Minimal interference with native biochemical processes inside living systems

RELATED MATERIALS

- J. Am. Chem. Soc., 2011, 133 (44), pp 17570–17573 Publication Date (Web): September 30, 2011 (Communication) DOI: 10.1021/ja2072934

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INVENTORS

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OTHER INFORMATION

CATEGORIZED AS

- **Biotechnology**
  - Genomics
  - Proteomics
- **Materials & Chemicals**
  - Biological
  - Chemicals
- **Medical**
  - Devices
  - New Chemical Entities, Drug Leads
  - Research Tools
  - Screening
- **Research Tools**
  - Expression System
  - Reagents

RELATED CASES

2012-014-0

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- Alkyne-Activated Fluorogenic Azide Probes
- Isotope Targeted Glycoproteomics For Nontemplated Glycan And Peptide Isoform Discovery

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