Cyanoindole Nucleosides as Fluorescent Nucleic Acid Reporters

Technology #20180322

Fluorescent nucleoside analogue with superior fluorescence and high quantum yield

A newly-discovered fluorescent nucleoside analogue, 4-cyanoindole-2'-deoxyribonucleoside (4CIN), has superior fluorescence properties and a high quantum yield in both single and double stranded DNA. 4CIN has a novel chemical structure as a nucleotide and nucleoside phosphoramidite. This new fluorescent nucleoside analogue could benefit DNA research by improving assay sensitivity, providing greater insight into DNA dynamics and potentially opening doors to new applications. Its numerous advantages make it likely that 4CIN will become a “go to” fluorescent nucleoside for many applications.

Significant advantages over 2-AP

Fluorescent nucleoside probes can be incorporated into oligonucleotides to enable monitoring of nucleic acid structure and function in real time. 4CIN offers a significantly higher quantum yield (QY) than the most popular, commercially available isomorphic nucleoside analogues. In particular, in comparison to the widely utilized 2-aminopurine (2-AP), 4CIN is a more efficient fluorophore (QY = 0.92 when excited at 305 nm), has a larger Stokes shift (107 nm versus 64 nm for 2-AP) and has red-shifted emission (maximum of 412 nm versus 369 nm for 2-AP). In addition, 4CIN is not quenched as significantly as 2-AP in DNA and, in one application, a 10-fold increase in QY (compared to 2-AP) was achieved.

Phase of Development

- Proof of concept

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Benefits

- Higher quantum yield in both single and double stranded DNA
- Superior fluorescence properties

Features

- Fluorescent nucleoside analogue, 4-cyanoindole-2’-deoxyribonucleoside (4CIN)
- 4CIN modification does not significantly impact oligonucleotide stability
- Easily synthesized as the phosphoramidite
- Easily incorporated into oligonucleotides

Applications

- Nucleoside, nucleotide and nucleoside phosphoramidite reagents for biomedical research
- Custom nucleic acid manufacturing
- Fluorescent purine mimic (e.g., DNA/RNA molecular recognition and screening assays, protein-DNA/RNA interactions, DNA-protein interactions, DNA dynamics)
- Fluorescent tags, probes, reporters, nucleotides
- Fluorescent nucleoside analogs

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**Interested in Licensing?**

The University relies on industry partners to scale up technologies to large enough production capacity for commercial purposes. The license is available for this technology and would be for the sale, manufacture or use of products claimed by the issued patents. Please contact Kevin Anderson to share your business needs and technical interest in this technology and if you are interested in licensing the technology for further research and development.

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