Multiple orthogonal labeling of oligonucleotides (P-1007)

Key Facts

- Easy, fast, and cost-effective post-synthetic multiple orthogonal labeling
- Highly efficient one step reaction; protection groups are not needed
- Solvent-independent, no chemical byproducts or side reactions

Abstract
Labeled oligonucleotides are used in research and for diagnostic, therapeutic and industrial applications. Current labeling methods require excess of fluorescent dye and multiple reaction and purification steps. In order to overcome these disadvantages, a fast method for post-synthetic multiple orthogonal labeling of oligonucleotides was developed by combining the inverse Diels-Alder reaction (DARinv) with the well-known copper-catalyzed azide-alkyne cycloaddition (CuAAC).

The Technology
A preferred embodiment involves the reaction of an N_3-reactive group as well as dienophile-modified oligonucleotide (RNA or DNA) with an N_3-modified label via a CuAAC reaction as well as a tetrazine-label via an inverse Diels-Alder reaction.

Development Stage
The method was tested and validated for a variety of oligonucleotides of different lengths.

Applications and Commercial Opportunity
The method can be used for research, biotechnology, diagnostic, and therapeutic applications. The technology allows the modification of oligonucleotides with a multitude of labels such as: fluorescent dyes, small molecules, peptides, antibodies, affinity tags, and other biomolecules.

Advantages
In comparison with known technologies for post-synthetic multiple orthogonal labeling, the combination of the inverse Diels-Alder reaction with the CuAAC offers the following advantages:

- one step reaction
- no intermediate purification steps necessary
- no side reactions
- fast and cost-effective

Inventor
The inventors are Juliane Schoch, Andres Jäschke, and Ayan Samanta, Heidelberg University, Germany and Manfred Wießler, DKFZ Heidelberg, Germany.

Intellectual Property
Priority EP2565199 and international PCT application “Multiple orthogonal labeling of oligonucleotides” WO2013029801.

DKFZ Contact:
For further information, please contact:

Dr. Christian Kliem
Deutsches Krebsforschungszentrum
Office of Technology Transfer T010
Email: c.kliem@dkfz.de
Tel.: +49-(0)6221-42-2948
Fax: +49-(0)6221-42-2956