Fluorescent derivative for non-catalytic labeling of nucleic acid and peptide components

Introduction:
Currently, non-catalytic labelling of biomolecules is intensively studied in connection with monitoring of their localization, interaction with other biomolecules or ligands or e.g. monitoring of their biosynthesis during intervening to cell system. Derivatives based on cyclooctyne, which are able to react with azido-compounds very fast at room temperature are often used for non-catalytic labelling. However, theymsuffer from complicated multi-step synthesis and low commercial availability. In this case, aza-dibenzocyclooctyne (dibenzoazocine) systems bearingmfluorescent label are used as an alternative. Till now, these systems were described as conjugates only with fluorescein, rhodaminemand coumarine. Thus, development of new dibenzoazocine conjugates is still very important and promising for labelling application.

Technology description:
Except values of excitation and emission maxima, solubility in water and values of quantum yield of fluorescent label, photostability of both indicator alone and its conjugates and minimal effect of indicator during fragmentation analysis of biomolecules are also important for its practical use. With respect to these facts, labels based on BODIPY excel, because they exhibit better photostability then fluorescein and have minimal effect on mobility of fragments during DNA sequencing. We have developed conjugate of BODIPY with dibenzazocine molecule which is able to bind spontaneously to proteins or nucleic acids bearing azido group and formed covalently labelled molecules.
Designed system then can be used for monitoring of proteosynthesis or synthesis of oligonucleotides as key factors of correct function of cells, enzymes or processes such as proliferation and apoptosis. By this way it can be possible to indicate various pathological changes. For this reason, the mentioned system can be used for diagnostics of serious diseases such as cancer.

Advantages over existing solutions:
The availability, complicated synthesis or chemical stability are the main disadvantages of already described systems. In addition, some of them suffer from high temperature necessary for labelling which can result in damage of molecular structure. On the other hand, our developed system is able to attach fluorescent label of BODIPY type to proteins, nucleic acids and their components. The labelling itself proceeds without catalyst in different solvents, at room temperature and with satisfactory intensity of fluorescence also at low concentrations.

Development status:
Prototype

IP protection:
CZ 30136

Ownership:
Institute of Molecular and Translational Medicine, Faculty of Medicine and Dentistry, Palacky University, Olomouc

Contact:
More information is available upon signing a CDA/NDA. Please contact IMTM´s director (director@imtm.upol.cz) or the technology transfer office (tto@imtm.upol.cz)