

EN ROUTE TO FLUORESCENT PROBES FOR NOVEL BIOMEDICAL ASSAYS

Fluorescence based assays are widely used in biomedical studies. Bright fluorescent emission of labels and probes enables us:

- to determine the concentration of biological molecules in solution,
- to visualize nucleic acid or protein bands on gels and in capillary,
- to control the progress of polymerase chain reaction in real time, and
- to observe biological tissues, cells (and even separate molecules in the microscope).

Each application requires appropriate fluorescent probes depending particularly on the application itself, biological molecule detected, solvent parameters, excitation and emission wavelength. A number of probes have been already developed for a variety of applications. Nevertheless, *taking into account rapid growth of proteomics and genomics, development of novel improved fluorescent-based assays for proteins and nucleic acids detection and quantification is of dramatic significance.* Consequently, novel probes with specific characteristics (i.e. excitation and emission wavelength, affinity to biological molecule of interest, etc.) are required. The search for the probe with the necessary characteristics is a very time, efforts and costs consuming process. From a set of available compounds and high diversity of imaginary ones that are still to be synthesized only few, if any, would possibly fit the requirements.

Our company, *OTAVA Ltd.*, proposed an original and pioneering approach to design fluorescent probes with required properties. It is called **"lead dye" method** that makes the discovery process faster and a positive result is more predictable. This method is based on prescreening of OTAVA's in-stock collection of dyes (about 2000 dyes of various classes) and then identifying "lead dyes". Their spectral characteristics should be as close as possible to the required ones. After selection of "lead dyes", they are undergoing further optimization which is based on chemical synthesis of the large series of its derivatives, followed by their testing in model systems.

The "lead dye" method was successfully applied by OTAVA researches to discover and commercialize a number of fluorescent probes.

Our prolific team-work with *Sigma-Aldrich* resulted in production of novel high-sensitive series of fluorescent dyes (**LUCY**) for nonspecific detection of proteins in gels:

<http://www.sigmaaldrich.com/life-science/cell-biology/detection/learning-center/lucy-stains.html>

LUCY dyes satisfy all requirements, to be routinely used in lab practices, such as sensitivity, high reproducibility, low protein-to protein variability, low cost, easy and fast staining procedure.

Using "lead dye" method *OTAVA* and *Sigma-Aldrich* jointly released novel fluorescent stain **Nancy-520** for *dsDNA* visualization on agarose gels.

In collaboration with *BioRad, Inc.* we also elaborated novel long-wavelength fluorescent probes for unspecific detection of proteins in separation systems that are suitable for excitation on 635 nm.

OTAVA's scientists are a team of highly experienced professionals engaged in synthesis of dyes of various families, elaboration of kits, reagents and analytical procedures for biomedical research.

Utilization of this "lead dye" approach gives to OTAVA great chances to discover novel fluorescent probes for biomolecules detection.

List of selected publications by OTAVA's scientists:

1. V. Kovalska, D. Kryvorotenko, M. Losytskyy, P. Nording, A. Rueck, B. Schoenenberger, S. Yarmoluk, F. Wahl. Detection of polyamino acids using trimethincyanine dyes // *US Patent US2006207881*, **21.09.2006**.
2. T.R. Berkelman, S.M. Yarmoluk, V.B. Kovalska, M.Yu. Losytskyy, K.D. Volkova. Use of squaraine dyes to visualize protein during separations // *Patent Application WO 2008/027821 A1*, **06.03.2008**.
3. K.D. Volkova, V.B. Kovalska, A.L. Tatarets, L.D. Patsenker, D.V. Kryvorotenko, S.M. Yarmoluk. Spectroscopic study of squaraines as protein-sensitive fluorescent dyes // *Dyes and Pigments*. – **2007**. – Vol. 72, No. 3 – P. 285–292.
4. O.M. Kostenko, V.B. Kovalska, K.D. Volkova, P. Shaytanov, I.O. Kocheshev, Yu.L. Slominskiy, I.V. Pisareva, S.M. Yarmoluk. New method for covalent fluorescent biomolecules labelling with hemicyanine dye // *Journal of Fluorescence*. – **2006**. – Vol. 16. – P. 589-593.

Contact details:

OTAVA Ltd.

150 Zabolotnogo St.

Kyiv 143, 03143

Ukraine

Tel./Fax: +380 44 522-24-58

info@otavachemicals.com