

Ignacy Gryczynski, PhD
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Microbiology, Immunology & Genetics
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Area of Expertise

My research interests cover fluorescence spectroscopy and its applications in biochemistry and biology. I am developing advanced fluorescence-based techniques for ultra-sensitive detection of analytes and biomedical agents. In particular, we have developed a FRET-based method for the selective detection of a metalloproteinase 9 enzyme (MMP-9) and micro RNAs. The enhanced detection of minute amounts of dye molecules has been achieved with a Metal Enhanced Fluorescence (MEF). Several plasmonic platforms have been developed and tested for MEF. These include silver island films, silver fractals, and silver nanowires deposited on glass/sapphire substrates. We demonstrated several hundredfold enhancements of the fluorescence signals by using our plasmonic platforms. We also applied surface plasmon coupled emission (SPCE) in fluorescence microscopy. SPCE transforms an isotropic fluorescence emission into a directional, fully polarized radiation. The SPCE radiation preserves all spectral properties of used fluorophores and offers a significant reduction of unwanted fluorescence background because of minimization of the excitation volume.

Qualifications

PhD in Physics, University of Gdańsk

MS in Physics, University of Gdańsk

Recent Publications

Fluorescence anisotropy imaging in drug discovery

Vinegoni, C., Feruglio, P. F., Gryczynski, I., Mazitschek, R. & Weissleder, R., 1 Nov 2019, In : Advanced Drug Delivery Reviews. 151-152, p. 262-288 27 p.

Spectroscopic method for estimation of MMP-9 enzyme concentration and activity

Synak, A., Serdiuk, I. E., Grobelna, B., Fudala, R., Gryczynski, I. & Bojarski, P., 15 Jul 2019, In : Journal of Molecular Liquids. 286, 110936.

Non-fluorescent filters for fluorescence detection with in-line geometry

Kimball, J., Chavez, J., Ceresa, L., Shah, S., Gryczynski, I. & Gryczynski, Z., 16 May 2019, In : Methods and Applications in Fluorescence. 7, 3, 037001.

Photophysical properties and detection of Valrubicin on plasmonic platforms

Synak, A., Szczepańska, E., Grobelna, B., Gondek, J., Mońka, M., Gryczynski, I. & Bojarski, P., 1 Apr 2019, In : Dyes and Pigments. 163, p. 623-627 5 p.

AMCA to TAMRA long range resonance energy transfer on a flexible peptide

Synak, A., Fudala, R., Gryczynski, I., Kułak, L., Shah, S., Serdiuk, I. E., Grobelna, B., Artukowicz, P., Kubicki, A. & Bojarski, P., Nov 2018, In : Dyes and Pigments. 158, p. 60-64 5 p.

Enhanced DNA detection using a multiple pulse pumping scheme with time-gating (MPPTG)

Kimball, J. D., Maliwal, B., Raut, S. L., Doan, H., Nurekeyev, Z., Gryczynski, I. & Gryczynski, Z., 21 Jun 2018, In : Analyst. 143, 12, p. 2819-2827 9 p.

Surface plasmon-assisted microscope

Borejdo, J., Gryczynski, Z., Fudala, R., Joshi, C. R., Borgmann, K., Ghorpade, A. & Gryczynski, I., 1 Jun 2018, In : Journal of Biomedical Optics. 23, 6, 060502.

Enhanced emission of Nile Red on plasmonic platforms

Synak, A., Bojarski, P., Grobelna, B., Gryczyński, I., Fudala, R. & Mońka, M., Apr 2018, In : Optical Materials. 78, p. 82-87
6 p.

Differences in the spatial distribution of actin in the left and right ventricles of functioning rabbit hearts

Nagwekar, J., Duggal, D., Rich, R., Fudala, R., Gryczynski, I., Raut, S., Gryczynski, Z. & Borejdo, J., Mar 2018, In : Medical Photonics. 27, p. 1-8 8 p.

Optimization and scale up of microfluidic nanopipome production method for preclinical and potential clinical trials

Gdowski, A., Johnson, K., Shah, S., Gryczynski, I., Vishwanatha, J. & Ranjan, A., 12 Feb 2018, In : Journal of Nanobiotechnology. 16, 1, 12.

Sponsored Projects

Dynamic Visualization of Ryanodine Receptor (RyR) Isoforms mRNA in Schwann Cells of the Rat Sciatic Nerve in an Ex-Vivo Model

Gryczynski, I.

Intramural Research (UAEM)

1/07/12 → 30/06/13

Engineering Resonance Energy Transfer for Advanced Immunoassays

Gryczynski, I., Gryczynski, Z. & Fudala, R.

National Science Foundation

1/06/13 → 31/12/17

Fluorescence Measurements of RNS60

Gryczynski, I.

Texas Christian University

15/03/14 → 31/12/14

Material Transfer and Sponsored Research with Revalesio Corporation

Gryczynski, Z. & Gryczynski, I.

Revalesio Corporation

30/08/13 → 30/08/14

Nanophotonic Approach to Imaging Exocytosis

Gryczynski, Z., Borejdo, J. & Gryczynski, I.

NCI: National Cancer Institute

1/03/10 → 28/02/13

Novel Fluorophores for Molecular and Cellular Imaging

Gryczynski, Z., Borejdo, J. & Gryczynski, I.

NIBIB: Nat Inst of Biomedical Imaging

1/04/11 → 31/01/17

Ratiometric SPCE Detection of Mi-RNA

Gryczynski, I., Borejdo, J. & Gryczynski, Z.

OMM SCIENTIFIC, INC.

1/09/09 → 31/12/11

Sequence-Specific Detection of Proteases Using Electronic p-Chips in a Multiplex Format

Fudala, R. & Gryczynski, I.

PharmaSeq, Inc.

1/02/15 → 31/01/17

Ultrasensitive SPCE technology for early detection and prevention of CVD for underserved and minority populations

Fudala, R. & Gryczynski, I.

NIMHD: Natl Institute on Minority Health

23/09/17 → 31/05/22

UNTHSC Support for Lockheed Martin in the area of Eye Safety Pertaining to Optical Radiation

Clark, A., Gryczynski, Z. & Gryczynski, I.

Lockheed Martin Missiles & Fire Control

1/10/11 → 31/12/12

Use of Silver Nanostructures on Microtransponders in an Ultra Sensitive Assay

Gryczynski, I.

PharmaSeq, Inc.

1/09/10 → 31/08/12