*i*Diagnostics *u*TIRF
TIRF Spectroscopy
TIRF Microscopy

TIRF Labs

Total Internal Reflection Fluorescence

uTIRF Biodetection Station
and *i*Diagnostics Application Development Kit

*i*Diagnostics - the Handheld Future of Precision Medicine

accurate, rapid, personalized, yet affordable molecular diagnosing

Develop *your* custom-design molecular diagnostics using uTIRF and *i*Diagnostics Application Development Kit

Early detection and prognosis of cancer and other diseases, personalized medicine, prevention of pandemics, food and water safety, and other health-care tasks require a highly sensitive, accurate, rapid, multiplexed, and yet affordable technology. Eleven years of research at TIRF Labs resulted in the development of such technology - handheld-based platform, termed - *i*Diagnostics. It is a thousand-fold more accurate and more sensitive than traditional methods. *i*Diagnostics is rapid and robust, yet inexpensive.

The goal of TIRF Labs is to make *i*Diagnostics available and affordable to every family on the globe. To facilitate the development of applications, TIRF Labs offers uTIRF biodetection station and Application Development Kit (ADK). We are offering these products to the diagnostic community, including academic, industrial, and government research groups. We will use the Open Innovation Approach to achieve synergy for collaborative development of molecular diagnostics products.

TIRF Labs offers: 1) uTIRF station - turnkey TIRF system, which includes lightguide-, prism-, and objective-TIRF with open perfusion and closed flow chambers, low light CMOS camera, 465-520-637 nm illuminator, 1X, 4X and 60X objectives, and 2) *i*Diagnostics Application Development kit, which consists of TIRF handheld cradle, cartridge blanks, manual microarrayer, reagents kit, and experimental protocols. This set of products is developed for facilitating biodetection stages of the biomarker discovery stage and bioassay development for existing and emerging biomarkers. We anticipate that collaboration with research groups that are developing and have developed panels of assays for molecular diagnosing will allow for creating superior clinical applications for accurate diagnosis and prognosis of cancer and other diseases.

TIRF Labs will provide comprehensive support for the development of *i*Diagnostics applications. We have incorporated prior feedback and will incorporate future comments from our users in the next releases of the uTIRF and ADKs. We will supply advanced hardware, software, reagents, development tools, protocols, videos, and other technical support to accommodate the requirements for different diagnostic applications.

Figs. 1, 2 show the optical scheme and photos of uTIRF, lgTRIF accessory, and manual microarrayer. Fig.3 shows *i*Diagnostics handheld cradle, and reusable cartridges designed for the development stage.

The arrays of bioassays printed at the surface of TIRF slide include assays for detecting protein, nucleic acid, and metabolite markers. The arrays contain internal controls to ensure reliability. The cartridge is equipped with a 20-microliters flow cell, which encompasses the TIRF microarray. *i*Diagnostics requires no or minimum sample preparation. Whole blood can be analyzed after addition of an anticoagulant. Simple sample preparation modules are included in the cartridge. Additional space is reserved for complex sample preparation modules as will be required for applications developed in the future. See *i*Diagnostics brochure and visit *i-diagnostics.net* website for more information.

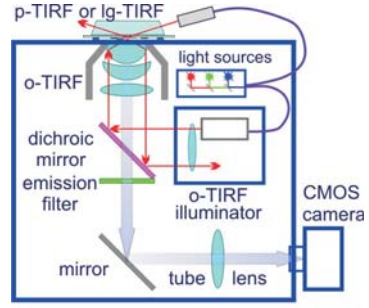


Fig.1. **uTIRF optical scheme**

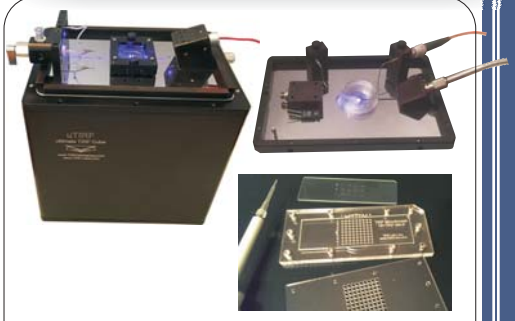
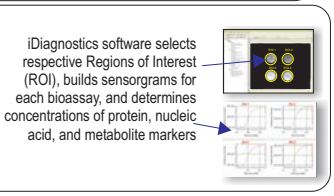


Fig. 2. uTIRF with pTIRF installed, lgTIRF - upper right, and manual microarrayer.

Fig.3. iDiagnostics handheld cradle with cartridges.

Fig. 4. Data acquisition and analysis



Accurate and Rapid Cell Phone Based Molecular Diagnostics

TIRF Microscopy
TIRF Spectroscopy
*i*Diagnostics - TIRF Arrays

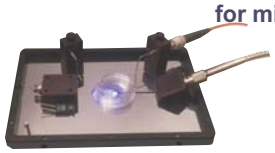
TIRF Labs

Total Internal Reflection Fluorescence

Prism- and Lightguide-based TIRF Microscopy Accessories

- Single molecule detection
- Super-resolution microscopy: STED, PALM, STORM, ...
- Minimal stray light, crisp, high-contrast TIRF images
- Work with dry, water-, and oil-immersion objectives
- Use UV or visible excitation light 190-900 nm
- Use Petri-dish, open perfusion, or closed flow chamber
- Nested design - fits inside 96-well plate, K-frame, 4-inch round, or manual XY stages
- Optional temperature, dielectrophoresis, electric field control

p-TIRF and lg-TIRF accessories for microscopy



Turnkey Single Molecule Detection TIRF Microscopy Station

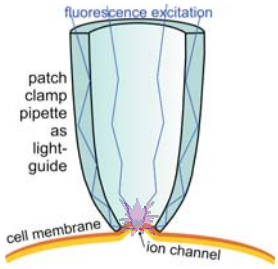
Modular TIRFM stations include:

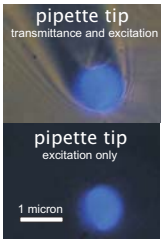
- Fluorescence microscope
- lg-, p-, or/and o-TIRF microscopy flow systems
- Low light EM CCD or sCMOS camera
- Multi-color computer-controlled illuminator
- Digital fluidics SmartFlow
- Optional temperature and electric field control
- Software for instrument control and data analysis

TIRF Accessories for Fluorometers

- **TIRF Accessory** TA-1004 transforms a spectrofluorometer into a super-sensitive TIRF biosensor instrument
- Optional electrochemical, DEP and temperature control
- **SmartFlow** Fluidic System allows to run unattended TIRF experiments, measure sensograms to derive k_{on} and k_{off}
- Microfluidic system allows for handling nanoliter volumes

Single ion Channel Single Molecule Detection





Patch clamp technique combined with fluorescence single molecule detection

*i*Diagnostics

accurate handheld molecular diagnostics

Real-time TIRF microarrays: Parallel supersensitive detection of protein, nucleic acid, and metabolite biomarkers

We extended TIRF into the 3rd dimension and invented iDiagnostics
Now you can hold a hospital laboratory in the palm of your hand

www.TIRF-Labs.com **info@tirf-labs.com**