

NanoLogix Inc.

Report on technologies

To assist in the commercialization, production, and marketing of NanoLogix BNP, N-Assay, BNF, and FlatPack technologies for use in general medical, clinical, food testing, pharmaceutical, BioDefense, veterinarian, environmental, and other industrial areas.

Explanation of technologies:

BioNanoPore (BNP)

BioNanoFilter (BNF) (under refinement)

N-Assay Multiwell Elisa test (under development)

FlatPack unique gas-flushed vacuum packaging for BNP and a wide variety of petri plates.

Research and development of three diagnostics products for specialized and multipurpose laboratories was first initiated by NanoLogix beginning in 2008 with the development of the BNP. The BNF followed in 2010. The FlatPack packaging was developed independently in 2011. The N-Assay MultiWell Plate began development in 2012 and patent application was made in 2013. The three rapid detection technologies are an order of magnitude beyond the Petri dish methods that currently provide the mechanism by which microorganisms and other substances and conditions are detected and analyzed in the medical, environmental and industrial fields. Patent applications have been filed and are pending under examination at US PTO, EPO and PCT.

The BNP patent has been granted in Japan (2013) and Russia (to be announced), and is pending in the US, China, Brazil, India and the EU, with the EU patent expected within weeks.

BNF is pending in the US as a standalone application and via Patent Cooperation Treaty (PCT) worldwide.

The N-Assay has been filed as a Provisional Patent application in the US, with PCT being filed.

The FlatPack packaging patent was granted in the US in April 2013 and recommended for grant by the PCT worldwide in May. NanoLogix holds an exclusive long-term license for the packaging technology, with the ability to sublicense to other manufacturers for use in production of products that are not within

NanoLogix core product areas.

The volume of Petri dishes used for traditional tests is in the multi millions per day worldwide. The market for BNP test kits is anticipated to be many of the current users for the traditional Petri dish. The N-Assay and BNF markets will be more specialized. The determining factor for use of both technologies is the need for rapid detection in association with identification. When time is of the essence, the BNP/N-Assay/BNF technologies should be the technologies of choice.

The industrial and medical sectors have a great interest in improved rapid detection and analysis methods and devices that shorten significantly the time lag between sampling and analysis. The normal 24-hour testing period that represents the best achieved by traditional methods and technologies can easily extend over several days during which scientific, medical and technical personnel are required to wait for results of required microbiological tests. This can cause companies expenses of millions of dollars through unnecessary delays, while delays in medical testing can cause the loss of hundreds of thousands of human lives worldwide.

According to Industrial Microbiology Market Review, worldwide industrial microbiology testing will undergo a tremendous growth phase in the near future, reaching a market value greater than \$4.9 billion. The number of rapid tests will increase 160%, while traditional tests will increase only 20%. The same growth pattern is anticipated in the medical microbiological diagnostics market, with a similar potential dollar volume.

NanoLogix's potential customers are varied and numerous. They include microbiological laboratories in the industrial, medical, environmental, governmental (federal, state and local) sectors, research and development activities, and educational institutions. Some of the NNLX products will be used broadly in laboratories outside the microbiological field.

The BNP, N-Assay, and BNF Breakthroughs

1. The BNP

The BNP is based on a membrane that is extremely thin, translucent, water permeable, and capable of working with organic and non-organic molecules and proteins. The BNP is non-permeable to cell structures, non-toxic for cells, hydrophilic, and non-fluorescent. The BNP membrane is covered by a thin layer of solid nutrient media and can be used with nutrient agars of the type widely used in microbiological diagnostics.

An important element of the BNP process is based on the fact that many organisms form

microcolonies with special characteristic shapes (morphology) that differentiate them from other substances. Filtration membranes can be used in combination with chromogenic solid media to color the microcolonies that grow on their surfaces. The microcolonies to be tested by the BNP are grown for a period of 5-6 hours, or less, on a membrane coated with nutrient media. The membrane is then transferred to another medium containing chromogenic substrates in order to provide a visible staining to the microcolonies. Coloration, or staining, then appears in the microcolony within 10-15 minutes. This colorization process is vital because microcolonies are invisible without added color.

The key advantages of the BNP over traditional technologies include the far more rapid detection of microbial growth on traditional and broadly-used nutrient agars. In critical laboratory testing by an independent lab with a global reputation for quality, the advantage has been demonstrated to be as much as 400 percent, with the BNP producing results within 5 to 6 hours compared to 24 hours with a traditional Petri plate, giving the BNP an overwhelming competitive advantage over existing methods.

The BNP technology has been used in studies by the world's largest private Research and Development Corporation (Contractual and Confidentiality agreements expressly prohibit NanoLogix from mentioning the name of the organization), with test results for identification of Anthrax, Plague, TB, E-coli, and other potential microbial threats being obtained 100% to 400% faster, and with the same quality of results, than any previously existing technology. Recent TB tests by this group have provided results in 5 days for TB culture results, as contrasted with traditional times of 3 weeks.

2. The N-Assay

Conceived in 2012 and currently under refinement, the N-Assay utilizes standard multiwell plates used in a unique method to deliver detection and identification of bacteria in frequently less than one hour. In tests at the University Of Texas Health Science Center at Houston (UTHSC-Houston), researchers have been able to reduce times for Group B Streptococcus and Gonorrhea from the traditional 48-72 hours to 30 minutes. Peer-reviewed papers are pending publication in medical scientific journals. Indications are that ANY bacteria for which an antibody exists will be detectable and identifiable through use of the N-Assay. NanoLogix is currently working with potential suppliers of select components for the assay in order to commercialize the test.

3. The Bio Nano Filter

The BNF is based on antibody/antigen reaction on a nitrocellulose filtering membrane. This material provides for simple and reliable diagnosis of substances as small as a single cell or

particle. It also provides for an extremely fast analysis.

The advantages of this technology include rapid detection and identification (as fast as a few minutes for live cells and 4-6 hours for microcolonies). The process is also simple in that it doesn't need sophisticated equipment and is extremely cost effective. This has enormous diagnostic applications for detection of contamination in medical, industrial and environmental areas.

In recent tests by the aforementioned R&D Corporation, the BNF delivered the following results for a multitude of bacteria:

Anthrax:	< 1 hour
Yersinia Pestis (Bubonic Plague):	< 1 hour
Salmonella:	< 1 hour
Cholera:	< 1 hour
Tuberculosis:	1.5 hours

NanoLogix's competition in the rapid diagnostics market consists of two technologies. These are PCR (Polymerase Chain Reaction) and Flow Cytometry. The PCR technology determines the DNA of a cell, but cannot ascertain whether a cell is alive or dead, nor can it be used for rapid and sensitive identification of dangerous microorganisms. The importance of the distinction between live and dead cells is extremely significant, as dead cells cannot reproduce and hence are not a threat, while live cells indicate the cell's ability to reproduce and constitute a threat.

The other technology competing with the BNF is Flow Cytometry, a process based on complicated opto-electronics utilizing computerized instrumentation, with an equipment acquisition price of approximately \$100,000. Flow Cytometry is "slow" in that while it can analyze one cell or particle in 1/10,000 of a second, it needs 18 hours to pass the standard sampling volume of 100 ml of liquid sample through a zone of 10 microns in diameter in order to provide results. NanoLogix's BNF is more flexible in its applications and can be used for both microbiological and immunological analysis.

Given the emergence of the BNP, N-Assay, and BNF, the two historic competitive methods are no longer state of the art.

FlatPack Packaging:

NanoLogix holds an exclusive long term license for a unique packaging system that has provided the following benefits for standard petri dishes and BNP:

1. Storability of standard Tryptic Soy Agar (TSA), a commonly used agar, for at least two years in cold storage and at least one year at room temperature. TSA from other manufacturers lasts for 3-1/2 months in cold storage and 1-1/2 months at room temperature.
2. Reduction of breakage in shipment to virtually none with the FlatPack, contrasted with up to 22% from major petri plate suppliers.
3. Increased speed of detection with TSA for many bacteria, based primarily upon the lack of oxidation of agars packaged with the FlatPacks.