

## Biosketch / Citation – Dr. Suresh Neethirajan

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Dr. Suresh Neethirajan is currently a registered Professional Engineer with the province of Ontario, and an Associate Professor in the Biological & Biomedical Engineering program of the University of Guelph and serving as the Director of the BioNano Laboratory. He joined the University of Guelph in 2011 after working as a Research Engineer at the Oak Ridge National Laboratory of United States, and also as a Research Scientist at the National Food Research Institute of Japan. Dr. Suresh graduated from the University of Manitoba with both his PhD and master's degree in Biosystems Engineering.

In recent years, Dr. Neethirajan has received more than a half-dozen national and international awards in recognition of the international impact of his research. He is the 2015 Young Engineer of the Year recipient of Engineers Canada and the 2015 Young Engineering Achievement award winner by both the Canadian and the NABEC section of the American Society for Agricultural and Biological Engineers. He also was the recipient of the Japan Society for the Promotion of Science fellowship and the Alexander von Humboldt fellowship of Germany in 2009.

Each of these awards recognizes him for his work as an internationally renowned scientist in the agri-food engineering research sector, and for substantive contributions in bionanotechnology for agri-food applications and veterinary health. He has also been a speaker at a number of international symposiums and conferences including the Senate of Canada, and contributed to a report on agriculture published by the Canadian government. Dr. Neethirajan is also an established source for international media on topics of bionanotechnology and has served in leadership roles for engineering organizations and at the university level.

Dr. Neethirajan's bionanolaboratory, located at the University of Guelph has achieved global stature for research and academic accomplishments in microfluidics and bionanotechnology for agri-food and veterinary health applications. His work has earned him a growing international reputation as the emerging Canadian research leader in bionanotechnology for these applications.

Known for his collaborative leadership and teaching style, Dr. Neethirajan has spearheaded what has become a leading research hub at the forefront of bionanotechnology research conducting pioneering work in food, agriculture and animal health. In just five years, a facility built from scratch houses over \$6 million worth of state-of-the-art equipment, and is globally recognized for innovation and scientific excellence that is truly the cornerstone of 21st century discoveries, making the bionanolab a distinguishing feature at the University of Guelph.

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Dr. Neethirajan's work has led to innovative biological tools and techniques for the enhanced understanding of interactions between pathogenic bacterium and antibiotic drugs when they come in contact. Recently, work on the development of on-farm rapid detection of avian influenza earned accolades and global media attention. Research in the areas of animal health diagnostics and food safety applications has dramatically increased prompt detection of contaminants, pathogens and viruses to provide a safer food source on a global scale.

His pioneering research on the investigation of biofilms using micro-nanotechnology has also led to the development of precise antibiotic susceptibility profiles for veterinary medicine applications, rapid drug screening platforms, and innovative "smart surfaces" for prevention of contamination by organisms in the food industry. These outstanding and innovative technical contributions in the area of development of bionanotechnology have dramatically influenced animal health and biosecurity tools and have made a lasting impact by enhancing food safety and controlling infectious diseases.

Dr. Neethirajan and his team of researchers study the complex behaviour of molecular cell mechanisms in order to develop new tools that benefit the agricultural and food sectors. His team's research of cellular nanoscale biological systems has led to the development of analytical and diagnostic hand-held tools that can emulate a lab in the field. This means animals with health issues can be diagnosed on the spot without waiting hours or days for a test result. The sooner a diagnosis, the quicker a remedy. No lab time also means savings for farm owners and producers.

So far, Dr. Neethirajan's bionanolab has developed:

- a biosensor for detecting the cause of milk reduction in dairy cattle,
- early identification of avian influenza in poultry from cell structure behaviour,
- chromosome imaging that marks genetic disorders,
- methods of screening pharmaceuticals for their effects on pathogenic bacteria,
- a microfluidic tissue model that emulates wounds and allows treatment in cases of drug-resistance,
- a biosensor that quickly detects allergens, such as peanuts and gluten,
- research and testing of the molecule quercetin in onions and its necrotic effect on cancer cells and as a food preservative.

Dr. Neethirajan's career achievements reflect a passion for excellence, evidenced by research results from his lab that continue to boost and provide solutions in the sectors of agri-food, animal health disease diagnostics, poultry animal production, post-harvest management, development and application of nanosensors and biosensors for identification of residues of agrochemicals, crop diseases and pests. Many of these developments are currently being used in the field today. Dr. Neethirajan's bionanolab continues to pioneer new areas of bionanotechnology, and generates new discoveries and innovative products that improve veterinary animal health and food safety. His vision to serve the community through his nanotechnology-driven innovation is highly commendable. His research results are published in over 65 refereed papers in top-rated international and foreign journals, three book chapters and have resulted in five US patents with a H-index of 17 as of March 2017. His predisposition for collaboration across the various fields of science has facilitated technological and knowledge creation involving many disciplines, paving the way for future inter-professional affiliations at many scientific levels. Such collaboration on projects has involved working with universities in many countries. In summary, Suresh Neethirajan has pioneered important developments on a world-scale in the field of bionanotechnology, in particular in the areas of veterinary animal health and food safety diagnostics. His research has resulted in the innovative developments of hand-held, portable technology that identifies cattle diseases at an early onset, and a device that detects miniscule amounts of allergens in food. Such technology effectively dispenses with time-consuming and potentially costly laboratory waiting periods.