



**Title: A Live Imaging Nanotechnology: Sensing the Brain from Spectral Analysis to Neuromolecular Imaging to Voltaic Photonics**

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In this fascinating world of Sensors, incredibly brilliant sensing devices are conceived every nanosecond. As Keynote Speaker, in *The 30<sup>th</sup> Annual Congress on Nanotechnology and Nanomaterials*, I wish to share with you a nanobiosensor, a **Nano Biotechnology** that encompasses a biomedical sensing device, smaller than one human hair, successful in sensing exact neuronal transmitters in temporal lobe brain in epilepsy patients, intraoperatively, *during surgery* performed in NYU Tisch Hospital (IRB Approved). Moreover, Live Imaging with this nanobiosensor sees precise neuronal release in a genetic animal model of depression, indeed, even as the animal is moving about. Such cutting edge discoveries, made possible by the BRODERICK PROBE<sup>®</sup> nanobiosensor have changed the way that scientists and medical doctors have viewed the brain, its function, dysfunction and treatments, pharmaceutical and/or neurosurgical. We can see inside the living brain online and *in vivo*! Therefore, this sleek nanobiosensor, BRODERICK PROBE<sup>®</sup>, a polymeric neuroprobe, is designed to diagnose and treat debilitating neurodegenerative and psychiatric brain disorders. This Keynote focusses on this unique series of nanobiosensors specifically as miniature nanosurgical biomedical devices for epilepsy, Parkinson's and affective disorders. NYU pathologists and immunologists report that the sensor does not cause gliosis (scars) nor does it promote bacterial growth with or without sterilization. I began this journey as a neuroscientist and transformed spectrometry into spectral analysis in the form of live electrochemistry using carbon allotropes in lipid matrices. Then, the journey led me into videotracking with Neuromolecular Imaging and now into Voltaic Photonics, using protein neuroprobes in dual photodiode/fiber optics. The nanobiosensor operates by detecting current at potential differences, experimentally specific for each neurotransmitter. Several neuromolecules are imaged selectively within subseconds in real time, *in vivo*, *in vitro* and *in situ*. What we have here, in one example, is a miniature biocompatible, photosensitive, electroactive polymeric sensing neuroprobe that operates by converting photonic energy into electrochemical energy, generating a photocurrent in the brain *via* ion channels in skull without opening the brain and/or opening the brain minimally. The output is provided in units of voltage. Laser diodes encompassing fiber optic proteins enable the electrochemical waveform to be seen as an electrochemical image. The photocurrent provides an imaging profile of neurochemicals derived from sensing the brain. Thus, our original BRODERICK PROBE<sup>®</sup> polymer, a **Nano Biotechnology** that sees inside the brain, is further enabled by quantum mechanics inventive art for advanced nanomedicine and nanosurgical sensing devices in the BRODERICK PROBE<sup>®</sup>. This photoelectrochemical conductance device provides another novel series of nanobiosensors for **Nano Biotechnology**, nano-diagnostics, nanotherapies and nanotheranostics.

## Biography

Patricia A. Broderick completed her Ph.D. degree in Pharmacology at St. John's University, College of Arts and Sciences in 1979, a postdoctoral fellowship at the Albert Einstein College of Medicine/Montefiore Hosp., Depts. of Psychiatry and Neuroscience, 1982-1985 and a Research Associate Position at Cornell University, Dept. of Neurology, NY, 1985-1986. Dr. Broderick began her tenured Medical Professorship in CUNY in Fall, 1986 and an Adjunct Professorship in NYU Langone Medical Center, NY, in 2000. In the Broderick Laboratory, Patricia mentors medical doctors, doctoral, masters and post-baccalaureate students in addition to undergraduate students, including top New York high school students. Patricia is the inventor of several patents, held by CUNY and in part by NYU and now held by **Eazysense Nanotechnologies Inc**, for manufacturing and worldwide marketing the BRODERICK PROBE®. Vested by **Indian Angel Network**®, the Company is founded by Dr. Broderick who serves as President of the Board of Directors. Dr. Broderick also serves as Editor-in-Chief (**J. Biochips & Tissue Chips**, USA), American Field Editor (**J. Neural Transm.**, Austria/Germany), Academic Editor and Board (**Sensors, Brain Sciences**, MDPI, Switzerland/China) and Editorial Boards worldwide such as (**E Cronicon**, Psychology & Psychiatry: Pharmacology; Neurology, London, UK); (**MOJ Medcrave, Clinical and Medical Cases**, USA/UK). Professor Broderick has published extensively, over 600 publications, demonstrations and presentations, has founded the **Broderick Brain Foundation**, and is inventor of the BRODERICK PROBE®, named in honor of her father. The Professor is author of several books including one in press, **Neuroimaging-Nanosensing Biochemistry in Brain (Pan Stanford Publishing Pte. Ltd, Singapore)** and Patricia is humble Awardee of numerous prestigious honors, among which, Inner Circle Executives, Acquisitions International Global/Corporate America, International Assc, of Top Professionals, Nat'l Assc Distinguished Professionals. Patricia is honored throughout her career, presently, several front cover magazines globally recognize her work, 2017, 2018 and 2019, "Top 100 Registry Educator" and others list, "Best Biosensor" "Industry Professor", "Business Woman", "CUTV Radio & TV Press" and "Empowering Professionals".

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