

**BIOGRAPHICAL SKETCH**

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NAME: Nandi, Somen

Feb 27, 2018

eRA COMMONS USER NAME (credential, e.g., agency login): SOMENNANDI

POSITION TITLE: Adjunct Professor, Dept. of Chemical Engineering, UC Davis;  
Managing Director, Global HealthShare® initiative, UC Davis

EDUCATION/TRAINING (*Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.*)

INSTITUTION AND LOCATION	DEGREE (if applicable)	Completion Date MM/YYYY	FIELD OF STUDY
University of Calcutta, City College, India	B.S. (Honors)	06/1989	Plant Biology (Hons)
North-Eastern Hill University, Shillong, India	M.S.	11/1991	Plant Biology
Bose Institute, University of Calcutta, India	Ph.D.	12/1997	Biotechnology

**NOTE: The Biographical Sketch may not exceed five pages. Follow the formats and instructions below.**

**A. Personal Statement**

I have been working on molecular breeding technology to produce the heterologous proteins in different platforms for past 20 years. I am also applying bioprocess-engineering technologies to produce recombinant proteins (including human therapeutic proteins and enzymes) using seeds, whole plants, harvested tissues or cells grown *in vitro* in bioreactors as hosts. This effort led me to develop five products, now in the market through [InVitria](#) (a sales wing of [Ventria Bioscience](#)) and two molecules for two human clinical trials. I am interested in translational research and continually strive to develop processes that are scalable, cost effective, and meet quality specifications and regulatory requirements. I have extensive experience in production, scale-up, purification and characterization of heterologous proteins using transgenic expression in seeds as well as transgenic/transient plant cell suspension cultures in bioreactors, and performing techno-economic analyses. In early 2016, I started working for Inserogen, Inc. and with Dr. Karen McDonald on transient production of biodefense agents and animal vaccines in plant systems. My formal training in biotechnology industry combined with my research experience in plant made pharmaceuticals, teaching experience in bioprocessing, and techno-economic modeling, and entrepreneurship training are well suited to my role in the proposed project.

My experience with multidisciplinary and collaborative scientific research projects have enabled me to appreciate the importance of intricate and multifaceted programs in diverse settings. Today, many scientific innovations, in order to succeed, need expertise from multiple disciplines to work together as a TEAM (Together Everyone Achieve More). I have successful experience on working and mentoring both in developing and developed countries, and managing teams with diverse expertise, cultural, and ethnic backgrounds. This experience motivated me to initiate [Global HealthShare® \(GHS\) initiative](#). GHS is a multi-institutional, global, and virtual organization where I serve as Founder and Managing Director. I am confident that soon the success of our pilot projects will be generating very positive and implementable information. I have served and am serving as PI or Co-PI on several extramural research projects over the years, as well as working as technical coordinator and directing experimental research, helping to supervise the research of employees, students/post-docs. I am also serving as a mentor/instructor for the biochemical engineering students including presenting several lectures, meeting with students outside of class to provide guidance on their design projects, and reviewing reports.

## Six recent publications that specifically highlight my experience and qualifications for this project:

- 1) Corbin, J.M., Kailemia, M.J., Cadieux C.L., Alkanaimsh S., Karuppanan, K., Rodriguez, R.L., Lebrilla C.B., Cerasoli, D.M., McDonald, K.A. and **Nandi, S.** (2018). Purification, Characterization, and N-glycosylation of Recombinant Butyrylcholinesterase from Transgenic Rice Cell Suspension Cultures, *Biotechnology and Bioengineering (In press)*.
- 2) Karuppanan, K, Duhra-Gill, S, Kailemia, JM, Phu, ML, Lebrilla, CB, Dandekar, AM, Rodriguez, RL, Nandi, S and McDonald, KM (2017). Expression, Purification, and Biophysical Characterization of a Secreted Anthrax Decoy Fusion Protein in *Nicotiana benthamiana*. *International journal of molecular sciences* 18.1: 89 - 102.
- 3) **Nandi, S.**, Kwong, A.T., Holtz, B., Erwin, R., Marcel, S., McDonald, K.A. (2016b) Techno-Economic Analysis of a Transient Plant-Based Platform for Monoclonal Antibody Production. Accepted in *mAbs* 8(8): 1456-1466.
- 4) Corbin, J.M., Hashimoto, B.I., Karuppanan, K., Kyser, Z.R., Wu, L., Roberts, B.A., Noe, A.R., Rodriguez, R.L., McDonald, K.A. and **Nandi, S.** (2016). Semicontinuous bioreactor production of recombinant butyrylcholinesterase in transgenic rice cell suspension cultures. *Frontiers in Plant Science* 7 1-9.
- 5) **Nandi S**, McDonald KA (2014). Expression of recombinant proteins in plant cell culture (Chapter 3) in *Plant-derived Pharmaceuticals: Principles and Applications for Developing Countries* Edited by Hefferon KL, Oxford, UK: CAB International, pp.20-41.
- 6) Langridge W, Odumosu O, **Nandi S**, Rodriguez RL, DeLeon M, Cordero-MacIntyre Z Mucosal vaccination against enteric pathogens in the developing world (2012). *British journal of medicine and medical research.* 2(3): 260-291.

## B. Positions and Honors

### Employment:

- 2016 - : Adjunct Professor, Dept. of Chemical Engineering, UC Davis
- 2010 - : Managing Director, Global HealthShare® initiative, UC Davis
- 2002 - 2009: Senior Scientist and Director, Molecular Breeding, Ventria Bioscience
- 1998 - 2001: Scientist and Group Leader, Molecular Genetics, Ventria Bioscience
- 1997 - 1998: Postdoctoral Researcher, Applied Phytologics, Inc.
- 1995 - 1997: Research Fellow and Consultant, IRRI, Philippines.
- 1992 - 1995: Senior Research Scholar, Bose Institute, Calcutta, India.

### Honors:

- Recognized for remarkable contribution - JMI Vaccine Ltd, Dhaka, Bangladesh, 2018
- Outstanding Scientist, Best Mentor, and Shareholder - Ventria Bioscience, USA. 2002-2009
- Visiting Scientists fellowship, JIRCAS, Japan, 1997
- Young Scientist Fellowship awarded by IUBMB, 1994
- Jawaharlal Nehru Fellowship, India 1995 – 1997, (now known as Fulbright-Nehru Scholarship)
- Gold Medal for achieving 1<sup>st</sup> position in all the semesters of M.S.

## C. Contribution to Science

Based on my standing in multidisciplinary research fields, following services are important to the science and society.

I have mapped the first major submergence tolerance gene (*Sub1t*) in rice, and based on my published report the gene has been cloned and introgressed in to submergence tolerance varieties that are currently popular in vast region of south-east Asia.

- 1) **Nandi S**, Subudhi P, Senadhira D, Manigbas NL, Sen-Mandi S and Huang N. (1997a). Mapping QTLs with AFLP and selective genotyping for submergence tolerance in rice. *Molecular and General Genetics* 255(1):1-8.
- 2) Maheswaran M, Subudhi PK, **Nandi S**, Xu JC, Parco A, Yang DC and Huang N. (1997). Polymorphism, distribution and segregation of AFLP markers in a doubled haploid rice population. *Theoretical and Applied Genetics* 94: 39-45.

I have jointly developed a Bacterial Artificial Chromosome (BAC) library that cover 90% of rice genome and currently is being used globally by over 150 researchers to clone desired genes through chromosome walking.

- 3) Yang DC, Parco A, **Nandi S**, Subudhi PK, Zhu Y, Guoliang W, Huang N. (1997). Construction of bacterial artificial chromosome (BAC) and identification of overlapping BAC clones with chromosome 4 specific RFLP markers in rice. *Theoretical and Applied Genetics* 95(7):1147-1154.

Led protein-process engineering and technology transfer for large-scale production from R&D to cGMP (current Good Manufacturing Practices) facility. This effort led to five products now in market through [InVitria](#) (a sales wing of [Ventria Bioscience](#)). Led Ventria's efforts on USDA/FDA/EPA (and SAG, Chile) environmental assessment and permitting procedures. Directed field and protein process engineering team with 100% compliance with federal and state regulations (pharmaceutical/output traits). Develop lab and process facility that is cGMP and ISO 9000 certified. Hired, trained, and managed scientists and researchers for regulatory, field, laboratory, and sales. Also. submitted and won several extramural grants.

- 4) Zhang, D., **Nandi, S.**, Bryan, P., Pettit, S., Nguyen, D., Santos, M., & Huang, N. (2010) Expression, purification, and characterization of recombinant human transferrin from rice (*Oryza sativa* L.). *Protein Expression and Purification* 74 (1): 69-79.
- 5) **Nandi, S.** and Huang N. (2009). *Expression of human milk proteins in mature rice grains*. In S. Datta (Ed.), Rice Improvement in the Genomics Era. Chapter 12, pp. 339-360, CRC Press, Taylor & Francis Group, Boca Raton, FL, USA.
- 6) **Nandi, S.**, Yalda, D., Lu S. M., Nikolov, Z., Misaki, R., Fujiyama, K., & Huang, N. (2005). Process development and economic evaluation of recombinant human lactoferrin expressed in rice grain. *Transgenic Research* 14: 237-249.
- 7) **Nandi, S.**, Wu, L., Chen L., Rodriguez, RL. and Huang, N. (2003) *Rice transformation with multiple plasmids*. In Advances in Rice Genetics, pp. 544-547. Edited by G.S. Khush, D.S. Brar and B. Hardy IRRRI Publication, Los Banos, Philippines.
- 8) **Nandi S**, Suzuki Y, Huang J, Yalda D, Pham P, Wu L, Bartley GB, Huang N and Lonnerdal B. (2002). Expression of human lactoferrin in transgenic rice grains for the application in infant formula. *Plant Science* 163:713-722.
- 9) Huang J, **Nandi S**, Wu L, Yalda D, Bartley GB, Rodriguez RL, Lonnerdal B and Huang N. (2002). Expression of natural antimicrobial human lysozyme in rice grains. *Molecular Breeding* 10:83-94.
- 10) Wu L, **Nandi S**, Chen L, Rodriguez RL and Huang N. (2002). Expression and inheritance of nine transgenes in rice. *Transgenic Research* 11:533-541.
- 11) Hwang Y-S, Yang D, McCullar C., Wu L., Chen L., Pham, P. **Nandi S.** and Huang N. (2002). Analysis of rice globuline promoter in transformed rice cells. *Plant Cell Report* 20:842-847.

Developed the "Train The Trainer" program with University of Rwanda (UoR), Africa that is currently under UoR's academic senate consideration to incorporate in their academic curriculum.

- 12) Doyle MM., Garcia S., Bahati E., Karamuzi D., Cullor JS. and **Nandi, S.** (2015). Microbiological analysis of raw milk in Rwanda. *African Journal of Food Science and Technology* 6(5): 141-143.
- 13) Cullor JS., Doyle MM., Garcia S., Venkatapuram P., and **Nandi S.** (2015) Dairy Dynamic Management. *NMC Annual Proceedings* 54:14-15.

Other recent examples of translational, interdisciplinary research that I am currently involved.

- 14) **Nandi S**, Thota S, Nag A, Divyasukhananda S, Goswami P, et al. Computing for rural empowerment: enabled by last-mile telecommunications. (2016a) *IEEE Communications*. 54(6): 102-109.
- 15) Goswami R, Dasgupta P, Saha S, Venkatapuram P, Nandi S. Resource integration in smallholder farms for sustainable livelihoods in developing countries (2016). *Cogent Food & Agriculture*. 2(1272151)

#### **Complete List of Published Work in MyBibliography:**

<https://www.ncbi.nlm.nih.gov/sites/myncbi/1r19tnqbfqyk9/bibliography/50800591/public>

#### **D. Research Support**

Selected ongoing and completed research projects (past three years)

#### **Current and Recent Research Projects:**

**Title:** Center for the Utilization of Biological Engineering in Space (CUBES)

**Goal:** Our overarching objective is to support biomanufacturing for deep space exploration that realizes the inherent mass, power, and volume advantages of space biotechnology over traditional abiotic approaches. CUBES will advance the practicality of an integrated, multi-function, multi-organism biomanufacturing system on a Mars mission.

**Agency:** National Aeronautics and Space Administration (NASA)

**Role:** Co-I

**Title:** Glycan modulation of pharmaceutical glycoproteins by *in vitro* enzymatic approaches

**Goal:** This multidisciplinary project are to improve fundamental understanding of *in vitro* enzymatic processes by modifying glycans on glycoproteins, and of the effects of glycan structures on the glycoprotein structure, stability, oligomerization, immunogenicity, and efficacy of therapeutic bioscavengers.

**Agency:** Defense Threat Reduction Agency (DTRA)

**Role:** Co-PI (Technical Coordinator)

**Title:** Promoting health and economic development in the Sundarban region of India through improved nutritional and agricultural education and outreach

**Goal** for this project is to design and implement a Sustainable Agriculture Research and Education Program based on best-practice crop management techniques applicable to the climate-challenged regions.

**Agency:** University Outreach and International Programs (UOIP) and Global HealthShare

**Role:** PI

**Title:** Novel bioreactor-based systems for producing ebola monoclonal antibodies in *Nicotiana benthamiana* plant cell suspension culture.

**Goal:** To produce three monoclonal “ZMapp” antibodies against ebola in plant cell culture media.

**Agency:** NSF Rapid Response Research (NSF-RAPID) Program

**Role:** Co-PI

**Title:** Rwanda Dairy Competitiveness Program II (RDCP II)

**Goal:** To serve as technical assistance group to help Land O'Lakes, Inc., International Development (LOL-ID) advance the goals of their RDCP II to identify key sources of morbidity and mortality on smallholder dairy farms and in-country training workshops, specifically focused on the animal health side of farm-management practices to build the capacity.

**Agency:** USAID/LOL-ID

**Role:** PI

**Title:** Recombinant BChE Production by Transient Agroinfiltration in *Nicotiana benthamiana* using a CMV#Based Expression System

**Goal:** To develop *in vitro* sialylation technology for plant expressed proteins and to demonstrate proof of concept using butyrylcholinesterase (BChE) produced by transient agroinfiltration in wild-type *Nicotiana benthamiana*.

**Agency:** US Defense Advanced Research Projects, DARPA

**Role:** Co-PI

**Title:** Viability, growth, stability and expression study of formulated and lyophilized rice calli (CellBrix) expressing recombinant butyrylcholinesterase (rBChE).

**Goal:** Production of recombinant butyrylcholinesterase (rBChE) in rice cell suspension culture and excretion of rBChE from metabolically-regulated transgenic cell cultures.

**Agency:** Leidos Inc.

**Role:** PI

**Title:** Dynamic social networks: from research to marketplace

**Goal:** To develop a collaboration software platform for content sharing within and among organizations.

**Agency:** NSF (I-CORPS Teams)

**Role:** Co-PI

**Title:** Alternate manufacturing processes for recombinant human butyrylcholinesterase

**Goal:** Production of recombinant butyrylcholinesterase (rBChE) in rice cell suspension culture.

**Agency:** SAIC Inc.

**Role:** Co-PI