

Ashim K. Datta

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CAREER RESEARCH INTERESTS:

Mechanistic understanding and optimization of food quality and safety in processes ranging from frying, baking, meat cooking, microwave heating, to produce cooling in the field and under vacuum. We develop physics-based models of energy or mass transport and combine with models of chemical kinetics or microbiological growth/inactivation to simulate food quality and safety, respectively, from fundamentals. Being physics-based, these models require precise properties of food that change during its processing, with location in the food and with time; thus we had to invest in measuring and/or predicting food properties that change with structure, temperature, and composition. We are also currently working on fundamentals-based (as opposed to empirical) prediction of properties like capillary diffusivity. As part of our collaborative project with several microbiologists on simulation-based enhancement of teaching and learning of food safety, we develop simulations of microbiological growth, process food safety, and risk, all requiring properties.

GRADUATE RESEARCH FIELDS OF CORNELL UNIVERSITY:

Biological Engineering, Food Science and Technology, Computational Science and Engineering

POSITIONS HELD:

2000-Present	Professor of Biological and Environmental Engineering, Cornell University.
1993-2000	Associate Professor of Agricultural and Biological Engineering, Cornell University.
1987-1993	Assistant Professor of Agricultural and Biological Engineering, Cornell University.

SABBATICAL LEAVES:

Spring 2016	Visiting Professor, Dept. of Electrical Engineering, Univ. of Padua, Italy, and Dept. of Agricultural and Food Engineering, IIT Kharagpur, India
Fall 2000, 2010	Visiting Professor, Dept. of Agro Engineering, Katholieke Universiteit Leuven, Belgium
Fall 1994	Visiting Professor, Dept. of Chemical Engineering and Materials Science, Univ. of Minnesota, Twin Cities Campus.

EDUCATION:

University of Florida at Gainesville	Ph.D. 1985. Agricultural (Food) Engineering with minors in Heat Transfer (Mech. Eng.) and Process Control (Chem. Eng.) <i>Dissertation:</i> Mathematical Modeling of Natural Convection and Conduction Heating of Foods with Application to On-Line Process Control
University of Illinois at Urbana-Champaign	M.S. 1982. Agricultural Engineering <i>Thesis:</i> Real Time Acquisition and Analysis of Data on Milk Electrical Conductivity
Indian Inst. of Technology, India	B.Tech. 1979. Agricultural Engineering

HONORS AND AWARDS:

Fellow, Institute of Food Technologists, 2013
Stephen H. Weiss Presidential Fellow, Cornell University, 2013
Mr. and Mrs. Richard F. Tucker '50 Excellence in Teaching Award, College of Engineering, Cornell Univ., 2012
USDA Regional Award for Food and Agricultural Sciences Excellence in College and University, 2011
State University of New York Chancellor's Award for Excellence in Teaching, 2010.
Michael Tien '72 Excellence in Teaching Award, College of Engineering, Cornell University, 2005.
Paper Award for the top papers of engineering merit, American Soc. of Agric. Engineers, 1988
Award of Excellence for the best Ph.D. dissertation, College of Agriculture, Univ. of Florida, 1986

RECOGNITIONS:

Eight students received the Best Paper Award from the Food Engineering Division of the IFT; Three students received the Best Paper Award from the Conference of Food Engineering.
Invited Presentations on food process modeling in conferences organized in Spain, Italy, Sweden, Belgium, Turkey, China, The Netherlands, Malaysia and Chile
Panel member, FDA funded project to the Institute of Food Technologists entitled, "How to Quantify the Destruction Kinetics of Alternative Processing Technologies"
Panel member, USDA NRI Competitive Grants Program (3 times)
External Examiner, Catholic University Leuven, Belgium; University of British Columbia, Vancouver, Canada; University of Nantes, France
Research citations in media, e.g., The New York Times, Discover, Business Weekly, Popular Science.

EXTERNAL GRANT SUPPORT (PI, Current):

NIFA AFRI

"Microfluidics and physics-based approaches to elucidate physical mechanisms of fresh produce contamination,"
"Enhancing Food Safety Education by Incorporating Simulation-Based Learning"

MEMBERSHIPS IN PROFESSIONAL AND HONOR SOCIETIES:

Institute of Food Technologists (IFT); American Society of Agricultural and Biological Engineers (ASABE); American Institute of Chemical Engineers (AIChE); American Society for Engineering Education (ASEE)

EDITOR AND EDITORIAL BOARD (Journals):

Associate Editor, *Transactions of the ASABE*; Editorial Boards, *Institution of Chemical Engineers Journal: Food and Bioproducts Processing*; *International Journal of Food Properties* and *International Journal of Food Engineering*

COURSES TAUGHT:

- Biological and Bioenvironmental Transport Processes (1990-1998, 2004-Present)
- Computer-Aided Engineering: Applications to Biomedical and Biological Processes (1996-Present)
- Food Physics (2016, Cornell); A Transport Phenomena Based Approach to Food Process Engineering. A graduate course taught at the Katholieke Universiteit, Leuven, Belgium and at Cornell University (1987-1994)
- Engineering Properties of Foods (1988-1994)

PUBLICATIONS (10 selected, 100+ total refereed journal articles):

Shirai, H., A. K. Datta and S. Oshita. 2017. Penetration of aerobic bacteria into meat: A mechanistic understanding. *Journal of Food Engineering* 196: 193-207.

Gulati, T. and A.K. Datta. 2016. Coupled multiphase transport, large deformation and phase transition during rice puffing. *Chemical Engineering Science*. 139:75-98. [Properties predicted over wide range of conditions.]

Datta, A. K. and M. Almeida. 2014. Properties relevant to infrared heating of foods. In *Engineering Properties of Foods*, 4th Edition. Edited by M. A. Rao, S.S.H. Rizvi, A. K. Datta, and J. Ahmed, Taylor & Francis, Florida.

Datta, A. K., G. Sumnu and G.S.V. Raghavan. 2014. Dielectric properties of foods. In *Engineering Properties of Foods*, 4th Edition. Edited by M. A. Rao, S.S.H. Rizvi, A. K. Datta and J. Ahmed, Taylor & Francis, Boca Raton, Florida.

Warning, A., P. Verboven, B. Nicolaï, G. van Dalen and A.K. Datta. 2014. Computation of mass transport properties of apple and rice from X-ray microtomography images. *Innovative Food Science & Emerging Technologies*. 24:14-27.

Datta, A. K., R. van der Sman, T. Gulati and A. Warning. 2012. Soft matter approaches as enablers for food macroscale simulation. Invited paper in *Faraday Discussions*, *Journal of the Royal Society of Chemistry*. 158:435-459. [how properties can be predicted from the fundamentals]

Gulati, T. and A. K. Datta. 2012. Food property estimation equations for enabling computer-aided food process engineering. *Journal of Food Engineering*. 116(2):483-504.

Halder, A., D.G. Black, P.M. Davidson and A.K. Datta. 2010. Development of associations and kinetic models for microbiological data to be used in comprehensive food safety prediction software. *Journal of Food Science*, 75(6):R107-R120.

Datta, A. K. 2006. Hydraulic permeability of food tissues. *International Journal of Food Properties*, 9(4): 767-780

Wang, Z. 2012. Construction and implementation of a biomaterial property database. M. Eng. Thesis in Biological and Environmental Engineering. Thesis Advisor: A. K. Datta.