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CURRICULUM VITAE

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# CHARLES L. COONEY

**Present Position** Robert T. Haslam (1911) Professor of Chemical Engineering, Emeritus  
Department of Chemical Engineering  
Massachusetts Institute of Technology

Faculty Director Emeritus  
Deshpande Center for Technological Innovation, MIT

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## Education

Massachusetts Institute of Technology      Ph.D. Biochemical Engineering (1970)  
Cambridge, MA                                      S.M. Biochemical Engineering (1967)

University of Pennsylvania                      B.S. Chemical Engineering (1966)  
Philadelphia, PA

## Honors

- *Honoris Causa* by Ramon Llull University in Barcelona, 2012
- Dieter & Inga Koehn Lecture, 2010
- Fellow of the American Chemical Society, 2009
- Founding Fellow, American Institute for Medical & Biological Engineering, 1992
- Institute of Biotechnological Studies, 1989 Gold Medal
- James Van Lannen Award for Distinguished Service to the Division of Microbial & Biochemical Technology of the American Chemical Society, 1985
- Food, Pharmaceutical & Bioengineering Division Award, American Institute of Chemical Engineers, 1983.
- Becten-Dickenson Award lecturer, American Society for Microbiology, 1977
- Listed in Who's Who in Frontiers of Science & Technology
- Listed in American Men of Science
- *Sigma Xi*

## Primary Research Interests

- Biochemical Process Engineering
- Biotech and Pharmaceutical Manufacturing
- Isolation and Purification of Biological Products
- Manufacturing Strategies in the Pharmaceutical Industry

C. L. Cooney

- Technology Innovation and Entrepreneurship

## Research and Professional Experience

<b>2010-2015</b>	Faculty Lead, Center for Innovation & Entrepreneurship, Skoltech Initiative
<b>2002-2014</b>	Founding Faculty Director, Deshpande Center for Technological Innovation
<b>1996</b>	Acting Department Head, Department of Chemical Engineering, MIT
<b>1995-2001</b>	Executive Officer, Department of Chemical Engineering, MIT
<b>1991-2014</b>	Co-Director, Program on the Pharmaceutical Industry, MIT
<b>1982-2014</b>	Professor of Chemical and Biochemical Engineering, MIT
<b>1975-1982</b>	Associate Professor of Biochemical Engineering, MIT
<b>1970-1975</b>	Assistant Professor of Biochemical Engineering, MIT
<b>1970, summer</b>	Consultant in Fermentation Technology, Squibb Institute for Medical Research
<b>1970</b>	Instructor of Biochemical Engineering, MIT
<b>1966-1970</b>	NIH Trainee, MIT
<b>1966</b>	Chemical Engineer, E.I. DuPont de Nemours & Co.

## Primary Teaching Responsibility

- Integrated Chemical Engineering (10.490, 2019-present)
- Integrated Chemical Engineering (10.491, 2010-2018)
- Principles & Practice of Drug Development (10.547J, 1991-present)
- Downstream Processing in Biotechnology (Course Director, Summer, 1985-present)
- Fermentation Technology (Summer, 1970-present)
- Biochemical Engineering (10.542, with D. I. C. Wang, 1970- 2000)
- Bioseparation Processes (10.565, semi-annually, 1982-2000)
- Biochemical Engineering Laboratory (10.591, with D. I. C. Wang, 1970-1985)
- Chemical Kinetics & Reactor Design (10.37, 1990-1998)
- Management Skills for Physicians, Scientists & Engineers in the Pharmaceutical Industry (Summer, 1991-1997)

## Visiting Professorships

<b>2012</b>	Visiting Academic Scholar, Balliol College, Oxford University
<b>2001-2002</b>	Visiting Professor, Department of Chemical Engineering, University of Cambridge
<b>1978</b>	Visiting Professor, Department of Chemical Engineering, University of Waterloo
<b>1975, June</b>	Lectures and Laboratory in Continuous Microbial Culture, Oeiras, Portugal
<b>1974, November</b>	Visiting Professor, Department of Chemical Engineering, University of Waterloo
<b>1974, August</b>	Visiting Professor, Centro de Investigacion del IPN, Mexico City, Mexico
<b>1973, March</b>	Visiting Professor, Gulbenkian Institute, Oeiras, Portugal

## Boards of Directors – Current

- Boyd Technologies, Lee, MA <http://www.boydtech.com>
- Farcast Biosciences (chair), Woburn, MA <http://www.farcastbio.com/>
- GreenLight Biosciences (chair), Medford, MA <http://greenlightbiosciences.com>
- Innovent Biologics, Shanghai, China <http://www.innoventbio.com/en/>
- Iterative Scopes, Boston, MA <https://www.iterativescopes.com/>
- LayerBio, Medford, MA <http://www.layerbio.com/team.html>
- Levitronix, Framingham, MA <http://www.levitronix.com/en/>

## Former Public Company Boards of Directors

- Genzyme
- Biocon, India
- Polypore International
- Cuno, Inc.
- Pall Corp.
- Astra AB

## Non-Profit Boards of Directors – Current

- Boston Symphony Orchestra, Board of Advisors, Emeritus
- Boston Ballet, Trustee Emeritus
- Leventhal Map & Education Center

## Professional Societies

- American Association for the Advancement of Science (AAAS)
- American Chemical Society & the Division of Microbial and Biochemical Technology (ACS)
- American Institute of Chemical Engineers and the Food, Pharmaceutical & Bioengineering Division (AIChE)
- American Society for Microbiology & the Fermentation and Biotechnology Division (ASM)
- International Society for Pharmaceutical Engineering (ISPE)
- Society for Industrial Microbiology (SIM)

## Offices & Committees in Professional Societies

- Engineering & Physical Sciences Research Council (EPSRC), 2002-2010
- Division of Microbial & Biochemical Technology of the American Chemical Society: Secretary/Treasurer, 1974-1978; Chairman-Elect and Program Committee, 1978; Chairman, 1979; Executive Committee, 1974-1980; Newsletter Editor, 1980-1982
- Fermentation & Biotechnology Division, American Society for Microbiology: Chairman-Elect, 1983; Chairman, 1984
- Continuing Education Committee of American Institute of Chemical Engineers, 1986-1994
- Committee on International Affairs, American Society for Microbiology, 1980-1983
- Liaison committee between the Division of Microbial & Biochemical Technology (ACS), and the League for International Food Education (LIFE), Chairman 1973-1974
- Standards Committee, Food & Bioengineering Section of the American Institute of Chemical Engineers (AIChE), 1971-1974

## Major Scientific Conference Organization

- Recovery of Fermentation Products, Engineering Foundation Conference, Sea Island, Georgia, January 29-February 3, 1984, Co-chairman
- Recovery of Bioproducts, Engineering Foundation Conference, Uppsala, Sweden, May 11-16, 1986, Co-chairman
- Recovery of Biological Products IX, Whistler, BC, May, 1999, Co-Chairman
- International Symposium on Continuous Manufacturing of Pharmaceuticals, 2005-2006, Chairman

## U.S. & International Organizations

- FDA Pharmaceutical Science Advisory Committee, 2003-2006

## C. L. Cooney

- Board – Recovery of Biological Conference Series, 1998-present
- Biotechnology Panel of the Canadian National Science and Engineering Research Council (NSERC) for review of Strategic Grants, 1983-1986
- Biotechnology Commission of the International Union of Pure and Applied Biochemistry (IUPAC), Titular Member, 1977-1981; Vice-Chairman, 1979-1981; Chairman, 1982-1985
- UNEP/UNESCO/ICRO Biotechnology & Applied Microbial Genetics Committee, 1977-1990
- International Committee for Economic and Applied Microbiology (ICEAM), Member-at-Large, 1974-1978; Vice-Chairman, 1978-1982; Executive Committee, 1982-1984
- Joint Working Group on the Production of Substances by Microbial Fermentation and Microbial Processes, 1979-1983; Control of Fermentation, 1974-1970; Project Coordinator on Cooperation. Advisor in the area of Modelling and Computer Means.
- US-USSR Joint Commission on Scientific and Technical Research & Development Panel of the Department of Energy, Energy Research Advisory Board (ERAB), 1980-1982
- Biomass Panel of the Department of Energy, Energy Research Advisory Board (ERAB), 1980-1982
- Ad Hoc Gasohol Study Group for Department of Energy, Energy Research Advisory Board (ERAB), 1979-1980
- Subcommittee of Committee on Animal Nutrition (CAN), National Research Council on Feeding Underutilized Feedstuffs to Animals, 1978-1983
- New Technology and Industrial Biotechnology Panel, Committee on Research Opportunities in Biology, Commission on Life Sciences, National Research Council, 1987-1989
- Committee on Bioprocess Engineering, Commission on Life Sciences, National Research Council, 1991-1992

## MIT Committees

- MIT Sanofi Joint Scientific Steering Committee
- Advisory committee to SMART Innovation Center
- Co-chair of the MIT India Strategy Group
- Faculty Director of the Downstream Processing summer course, MIT Professional Institute
- Executive Committee of the Masdar Institute of Science and Technology (Abu Dhabi)
- Center of Biomedical Innovation steering committee
- Steering committee of the bioengineering section of the MIT Portugal Program
- Steering committee of the Novartis MIT Center for Continuous Manufacturing
- Advisory Committee for Regional Engagement ACRE
- MIT NIH Engagement Committee
- Executive committee of the Legatum Center
- MIT Faculty Administration Committee (2005-2010)
- MIT Faculty Council (2003-2010)
- Department Graduate Committee (beginning September, 2002-2006)
- Institute Committee on Intellectual Property (2002-2008)
- Deshpande Center Steering Committee (2001-present)
- Environmental Health and Safety Sub-committee (2001)
- MIT Industry Council on Industrial Relations (1996-1998)
- Administrative Clustering Committee, Department of Chemical Engineering (1996)
- Department Computer Committee (1995-2001)
- Ad hoc Committee on Departmental Operations (1993-1994)
- MIT Professional Institute Steering Committee, MIT (1993-2003)
- Institute Committee on Corporate Relations 1993-1996, Chairman, 1996

## C. L. Cooney

- Ad Hoc Committee on Chemistry in Chemical Engineering (CINCHE) 1991
- Graduate Admissions Committee, Department of Chemical Engineering, 1990-1995
- Undergraduate Committee, Department of Chemical Engineering, 1989-present, Chairman, 1995-2001
- Community Service Fund Board, MIT Institute Committee, 1986-2002
- Biotechnology Process Engineering Center (BPEC) Operating Committee, 1985-1994
- Interdepartmental Biotechnology Committee, Co-Chairman, 1983-1985
- Chemical Engineering Practice School Steering Committee, 1983-1989
- Faculty Search Committee, Department of Chemical Engineering, MIT 1981-1987 and 1995
- Faculty Search Committee, Department of Applied Biological Sciences, MIT 1983-1984
- Independent Activities Period Committee, MIT Institute Committee, 1981-1984
- Ad Hoc Committee on Faculty and Staff Retirement Income and Related Benefits, MIT Institute Committee, 1978-1980
- Staff-Administration Committee, MIT Institute Committee, 1976-1979
- Committee on Graduate Students, Nutrition and Food Science Department Committee, 1979-1982
- Committee on Nutrition and Food Science Departmental Resources, Chairman, 1979-1981
- Undergraduate Affairs Committee, Nutrition and Food Science Department Committee, 1973-1982; Chairman, 1977-1982
- Undergraduate Research Opportunities Program, Nutrition and Food Science Department Coordinator, 1971-1974; 1978-1981
- Committee on U.S. Competitiveness, 1987-1989

## International Review Panels

- External Review Committee, Department of Chemical Engineering, University of Cambridge, 2000-2004
- VIB International Review Panel, 1999, 2005, 2010 Chairman, 1999 & 2005
- External Review, Department of Food Engineering and Biotechnology, Technion, Israel, 2001

## Patents

1. Tannenbaum, S.R., J.C. Weaver and C.L. Cooney, Assignors to MIT. Biochemical temperature sensitive probe and method for measuring reactant concentration (issued April, 1975). U.S. Patent 3,878,049, British Patent 1,448,787, Canadian Patent 999,340, Swedish Patent 740 4540-2.
2. Cooney, C.L. and E. Schaefer, Assignors to MIT. Process of producing maltase (1982). U.S. Patent 4,332,899.
3. Langer, R., R. Linhardt, C.L. Cooney and P. Galliher, Assignors to MIT. Process for producing heparinase (1982). U.S. Patent 4,341,869.
4. Langer, R., R. Linhardt, M. Flanagan, P. Galligher, C. Cooney, M. Klein, Assignors to MIT. Apparatus for Neutralizing Heparin (1983). U.S. Patent 4,373,023.
5. Langer, R., R. Linhardt, C.L. Cooney, G. Fitzgerald, R. Grant, Assignors to MIT. Heparin derived anti-coagulants and process. U.S. patent 4,396,762.
6. Cooney, C.L. and E. Schaefer, Assignors to MIT. An improved process for maltase production. U.S. patent pending.
7. Langer, R.S., Jr., R. Linhardt, C.L. Cooney and P.M. Galliher, Assignors to MIT. Process for producing heparinase (1984). U.S. patent 4,443,45.
8. Cameron, D. and C.L. Cooney, Assignors to MIT. Fermentation process for preparation of propanediol. U.S. patent pending.
9. Cabral, J., Robinson, E.M. Robinson and C.L. Cooney, Assignors to Genzyme Corp. Membrane filtration of cell culture media with charged particles.(1989) U.S. patent 4,830,753.

10. Zimmerman, J., and C.L. Cooney, Assignors to MIT. Large Scale Method For Purification of High Purity Heparinase. U.S. patent No. 5,169,772., European Patent No. 0 420 894, Austrian Patent No. AT E 113 991, German Patent No. DE 689 19 360, Japanese Application No. 1-506606.
11. Romette, J.L., and C.L. Cooney, Assignors to MIT. L-Glutamine Sensor (October, 1988) U.S. Patent 4,780,191.
12. Cooney, C. L. and R. Willson, Assignors to MIT. Use of Hydrates for Aqueous Solution Treatment. U.S. Patent 4,678,583.
13. Sasisekharan, R. , M. Moses, M. Nugent, C. L. Cooney, R. S. Langer, D. P. Lombardi, Assignors to MIT. Method for Inhibiting Angiogenesis Using Heparinase. (application)
14. Sasisekharan, R., D. L. Lohse, C. L. Cooney, R. J. Linhardt, R. S. Langer, Assignors to MIT. Purification of Heparinase I, II and III from Flavobacterium heparinum. U.S. Patent 5,389,539.
15. Sasisekharan, R., M. Moses, M.A. Nugent, C. L. Cooney, R. S. Langer, D.P. Lombardi, Assignors to MIT. Method for Inhibiting Angiogenesis Using Heparinase. U.S. Patent 5,567,417. and Japanese patent application - 9-508892 sept 9, 1997)
16. Sasisekharan, R., D. L. Lohse, C. L. Cooney, R. J. Linhardt, R. S. Langer, Assignors to MIT, Purification, Composition and Specificity of Heparinase I, II and III from Flavobacterium Heparinum. US Patent 5,569,600
17. Venkataraman, G., V. Sasisekharan, R. Sasisekharan, R. Bobba, C.L. Cooney, R. S. Langer, Assignors to MIT, Computer-Implemented Process and Computer System for Estimating the Three- Dimensional Shape of a Ring-shaped Molecule Containing a Ring-Sharped Structure. US Patent 5,619,421
18. Godavarti, Ranganat, et al. , Rationally Designed Polysaccharide Lyases Derived form Heparinase I. WO 97/16556 (file 6517)
19. Zimmerman, J. and C. L. Cooney, assignors to MIT, "Large Scale Method for Purification of High Purity Heparinase", Japanese Patent Np. 2603349
20. Sasisekharan, R., C. L. Cooney, K. Moreman, J. J. Zimmerman, R. S. Langer, Heparinase Gene From Flavobacterium Heparinum U S Patent 5,714,376.

## Books

1. Olsen, Alfred C., and Charles L. Cooney, eds. 1973. *Immobilized Enzymes in Food and Microbial Processes*. New York: Plenum Press.
2. Wang, Daniel I. C., Charles L. Cooney, Arnold L. Demain, Peter Dunnill, Arthur E. Humphrey, and Malcolm D. Lilly., eds. 1979. *Fermentation and Enzyme Technology*. New York: John Wiley & Sons.
3. Cooney, Charles L., A. E. Humphrey, and Murray Moo-Young, eds. 1985. *Comprehensive Biotechnology: The Principles, Applications, and Regulations of Biotechnology in Industry, Agriculture, and Medicine*. Vol. 2. Oxford: Pergamon Press.
4. Cooney, Charles L., and D. I. C. Wang, eds. 1986. *Chemical Engineering Communications, Special Edition Honoring A.E. Humphrey*. Vol. 45.
5. Heinzle, Elmar., Arno P. Biwer, and Charles L. Cooney. 2006. *Development of Sustainable Bioprocesses: Modeling and Assessment*. John Wiley & Sons.

## Major Reports

1. The Biomass Panel of the Energy Research Advisory Board. 1983. "Biomass Energy." *Solar Energy*. Pergamon. [https://doi.org/10.1016/0038-092X\(83\)90002-6](https://doi.org/10.1016/0038-092X(83)90002-6).
2. National Research Council. 1983. *Underutilized Resources as Animal Feedstuffs*. National Academies Press. <https://doi.org/10.17226/41>.
3. National Research Council. 1989. *Opportunities in Biology*. National Academies Press. <https://doi.org/10.17226/742>.

## Publications

1. Cooney, C. L., D. I. C. Wang, and R. I. Mateles. 1969. "Measurement of Heat Evolution and Correlation with Oxygen Consumption during Microbial Growth." *Biotechnology and Bioengineering* 11 (3): 269–81. <https://doi.org/10.1002/bit.260110302>.
2. Cooney, Charles L. 1970. "Double Nutritional Deficiencies in Continuous Microbial Culture." Massachusetts Institute of Technology. PhD Thesis
3. Cooney, Charles L., and Daniel I. C. Wang. 1971. "Oxygen Transfer and Control." *Biotechnology and Bioengineering Symposium 2*: 63–75.
4. Demain, A. L., and C. L. Cooney. 1972. "Continuous Culture-1971." *Process Biochemistry* 7 (7): 21–23.
5. Cooney, Charles L., and David W. Levine. 1972. "Microbial Utilization of Methanol." *Advances in Applied Microbiology* 15 (C): 337–65. [https://doi.org/10.1016/S0065-2164\(08\)70096-0](https://doi.org/10.1016/S0065-2164(08)70096-0).
6. Acevedo, F., and C. L. Cooney. 1973. "Penicillin Amidase Production by *Bacillus Megaterium*." *Biotechnology and Bioengineering* 15 (3): 493–503. <https://doi.org/10.1002/bit.260150306>.
7. Levine, D. W., and C. L. Cooney. 1973. "Isolation and Characterization of a Thermotolerant Methanol-Utilizing Yeast." *Applied Microbiology* 26 (6): 982–90. <https://doi.org/10.1128/AEM.26.6.982-990.1973>.
8. Cooney, Charles L., and John Hueter. 1974. "Enzyme Catalysis in the Presence of Nonaqueous Solvents Using Chloroperoxidase." *Biotechnology and Bioengineering* 16 (8): 1045–53. <https://doi.org/10.1002/bit.260160805>.
9. White, G. E., C. L. Cooney, A. J. Sinskey, and S. A. Miller. 1974. "An *In Vitro* Assay to Measure Early Calcium Loss from Surface Enamel." *Journal of Dental Research* 53 (2): 481–85. <https://doi.org/10.1177/00220345740530025101>.
10. Hamilton, Bruce K., Clark K. Colton, and Charles L. Cooney. 1974. "Glucose Isomerase: A Case Study of Enzyme-Catalyzed Process Technology." In *Immobilized Enzymes in Food and Microbial Processes*, edited by Alfred Olson and C. L. Cooney, 85–131. Springer US. [https://doi.org/10.1007/978-1-4684-2088-3\\_7](https://doi.org/10.1007/978-1-4684-2088-3_7).
11. Cooney, C. L., J. C. Weaver, S. R. Tannebaum, D. V. Faller, A. Shields, and M. Jahnke. 1974. "The Thermal Enzyme Probe — A Novel Approach to Chemical Analysis." In *Enzyme Engineering Volume 2*, edited by E. Kendall Pye and Lemuel B. Wingard, 411–17. Boston: Springer. [https://doi.org/10.1007/978-1-4615-8897-9\\_58](https://doi.org/10.1007/978-1-4615-8897-9_58).
12. White, G. E., C. L. Cooney, A. J. Sinskey, and S. A. Miller. 1974. "A Defined Continuous Culture Medium for *Streptococcus Mutans*." *Journal of Dental Research* 53 (3): 762–762. <https://doi.org/10.1177/00220345740530034201>.
13. Snedecor, Bradley, and Charles L. Cooney. 1974. "Thermophilic Mixed Culture of Bacteria Utilizing Methanol for Growth." *Applied Microbiology*. Vol. 27.
14. Acevedo, F., and C. L. Cooney. 1975. "Penicillin Amidase and Penicillinase Production in Nitrogen- and Sulfur-Limited Chemostats." *European Journal of Applied Microbiology and Biotechnology* 2 (1): 9–17. <https://doi.org/10.1007/BF01385441>.
15. Cooney, Charles L., and Roy A. Ackerman. 1975. "Thermophilic Anaerobic Digestion of Cellulosic Waste." *European Journal of Applied Microbiology and Biotechnology* 2 (1): 65–72. <https://doi.org/10.1007/BF01385447>.
16. Cooney, Charles L., and Donald L. Wise. 1975. "Thermophilic Anaerobic Digestion of Solid Waste for Fuel Gas Production." *Biotechnology and Bioengineering* 17 (8): 1119–35. <https://doi.org/10.1002/bit.260170804>.
17. Cooney, C. L., and D. W. Levine. 1975. "Yeast Production from Methanol as a Source of Single-Cell Protein." In *Single-Cell Protein II*, edited by Steven R. Tannenbaum and Daniel I. C. Wang, 402–23. Cambridge, MA: M.I.T. Press.
18. Cooney, C. L., and S. R. Tannenbaum. 1975. "Variation of Composition of Bacteria and Yeast and Its Significance to Single-Cell Protein Production." In *International Biological Programme Synthesis: Food Protein Sources*, edited by N. W. Pirie, 4:223–32. London: Cambridge University Press.

19. Mou, Duen-Gang, and Charles L. Cooney. 1976. "Application of Dynamic Calorimetry for Monitoring Fermentation Processes." *Biotechnology and Bioengineering* 18 (10): 1371–92. <https://doi.org/10.1002/bit.260181005>.
20. Koplove, H. Michael, and Charles L. Cooney. 1976. "A Continuous Assay for an Intracellular Enzyme: The Analysis of Acetate Kinase in *Escherichia Coli*." *Analytical Biochemistry* 72 (1–2): 297–304. [https://doi.org/10.1016/0003-2697\(76\)90533-9](https://doi.org/10.1016/0003-2697(76)90533-9).
21. Matteo, C. C., C. L. Cooney, and A. L. Demain. 1976. "Production of Gramicidin S Synthetases by *Bacillus Brevis* in Continuous Culture." *Journal of General Microbiology* 96 (2): 415–22. <https://doi.org/10.1099/00221287-96-2-415>.
22. White, G. E., C. L. Cooney, A. J. Sinskey, and S. A. Miller. 1976. "Continuous Culture Studies on the Growth and Physiology of *Streptococcus Mutans*." *Journal of Dental Research* 55 (2): 239–43. <https://doi.org/10.1177/00220345760550021301>.
23. Cooney, C. L., D. I. C. Wang, and R. I. Mateles. 1976. "Growth of *Enterobacter Aerogenes* in a Chemostat with Double Nutrient Limitations." *Applied and Environmental Microbiology* 31 (1): 91–98. <https://doi.org/10.1128/AEM.31.1.91-98.1976>.
24. Troiano, R. A., D. L. Wise, D. C. Augenstein, R. G. Kispert, and C. L. Cooney. 1976. "Fuel Gas Production by Anaerobic Digestion of Kelp." *Resource Recovery and Conservation* 2 (2): 171–76. [https://doi.org/10.1016/0304-3967\(76\)90007-X](https://doi.org/10.1016/0304-3967(76)90007-X).
25. Augenstein, D. C., D. L. Wise, R. L. Wentworth, and C. L. Cooney. 1976. "Fuel Gas Recovery from Controlled Landfilling of Municipal Wastes." *Resource Recovery and Conservation* 2 (2): 103–17. [https://doi.org/10.1016/0304-3967\(76\)90002-0](https://doi.org/10.1016/0304-3967(76)90002-0).
26. Cooney, Charles L., and Daniel I. C. Wang. 1976. "Transient Response of *Enterobacter Aerogenes* under a Dual Nutrient Limitation in a Chemostat." *Biotechnology and Bioengineering* 18 (2): 189–98. <https://doi.org/10.1002/bit.260180205>.
27. Weaver, James C., Charles L. Cooney, Scott P. Fulton, Peter Schuler, and Steven R. Tannenbaum. 1976. "Experiments and Calculations Concerning a Thermal Enzyme Probe." *Biochimica et Biophysica Acta (BBA) - Enzymology* 452 (2): 285–91. [https://doi.org/10.1016/0005-2744\(76\)90178-9](https://doi.org/10.1016/0005-2744(76)90178-9).
28. Montville, T. J., C. L. Cooney, and A. J. Sinskey. 1977. "Distribution of Dextranase in *Streptococcus Mutans* and Observations on the Effect of Soluble Dextran on Dextranase Activities." *Infection and Immunity* 18 (3): 629–35. <https://pubmed.ncbi.nlm.nih.gov/591060/>.
29. Cooney, C. L., B. R. Snedecor, D. W. Levine, R. A. Ackerman, and J. Lee. 1977. "Thermophilic Processes for the Production and Utilization of C-1 Compounds." In *Developments in Industrial Microbiology: A Publication of the Society for Industrial Microbiology*, 18:255–66. Society for Industrial Microbiology.
30. Cooney, C. L., and N. Makiguchi. 1977. "Assessment of Single Cell Protein from Methanol-Grown Yeast." In *Biotechnology and Bioengineering Symposium*. Vol. 19. Mexico City. <https://www.osti.gov/biblio/5373180-assessment-single-cell-protein-from-methanol-grown-yeast>.
31. Cooney, C. L., J. Leung, and A. J. Sinskey. 1977. "Growth and Physiology of *Streptococcus Mutans* during Transients in Continuous Culture." *Microbiology Abstracts, Section A* 12: 799–808.
32. Cooney, C. L., and F. Acevedo. 1977. "Theoretical Conversion Yields for Penicillin Synthesis." *Biotechnology and Bioengineering* 19 (10): 1449–62. <https://doi.org/10.1002/bit.260191004>.
33. Cooney, Charles L. 1977. "Chemical Sources of Food: An Approach to Novel Food Sources." In *Environmental Chemistry*, edited by J. Bockris, 53–94. Springer US. [https://doi.org/10.1007/978-1-4615-6921-3\\_4](https://doi.org/10.1007/978-1-4615-6921-3_4).
34. Montville, T. J., C. L. Cooney, and A. J. Sinskey. 1977. "Measurement and Synthesis of Insoluble and Soluble Dextran by *Streptococcus Mutans*." *Journal of Dental Research* 56 (8): 983–89. <https://doi.org/10.1177/00220345770560082701>.
35. Cooney, Charles L., Henry Y. Wang, and Daniel I. C. Wang. 1977. "Computer-Aided Material Balancing for Prediction of Fermentation Parameters." *Biotechnology and Bioengineering* 19 (1): 55–67. <https://doi.org/10.1002/bit.260190106>.



36. Wang, Henry Y., Charles L. Cooney, and Daniel I. C. Wang. 1977. "Computer-Aided Baker's Yeast Fermentations." *Biotechnology and Bioengineering* 19 (1): 69–86.  
<https://doi.org/10.1002/bit.260190107>.
37. Wise, D. L., R. L. Wentworth, D. C. Augenstein, and C. L. Cooney. 1978. "Multi-Stage Digestion of Municipal Solid Waste to Fuel Gas." *Resource Recovery and Conservation* 3 (1): 41–59.  
[https://doi.org/10.1016/0304-3967\(78\)90029-X](https://doi.org/10.1016/0304-3967(78)90029-X).
38. Wang, D. I. C., C. L. Cooney, A. L. Demain, R. F. Gomez, and A. J. Sinskey. 1978. "Degradation of Cellulosic Biomass and Its Subsequent Utilization for the Production of Chemical Feedstocks. Progress Report, September 1–November 30, 1978." <https://doi.org/10.2172/5843634>.
39. Wang, D. I. C., C. L. Cooney, S. D. Wang, J. Gordon, and G. Y. Wang. 1978. "Anaerobic Biomass Degradation to Produce Sugars, Fuels and Chemicals." In *Proceedings of the Second Annual Symposium on Fuels from Biomass. Rensselaer Polytechnic Institute*, 537–47. New York.
40. Weaver, J. C., F. M. Reames, L. DeAlleaume, C. R. Perley, and C. L. Cooney. 1978. "Continuous Measurements on Immobilized Cells by a Mass Filter." In *Enzyme Engineering*, 403–4. Springer US.  
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