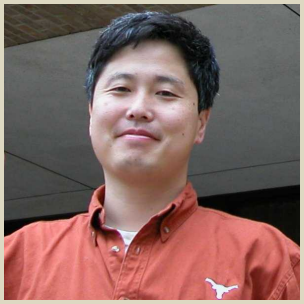


Takaaki TANAKA, Ph.D.

Professor
Program: Advanced Materials Science and Technology
Area: Materials Science and Technology
Undergraduate: Dept. of Materials Science & Technology
http://www.tctanaka.eng.niigata-u.ac.jp/

Professional Expertise

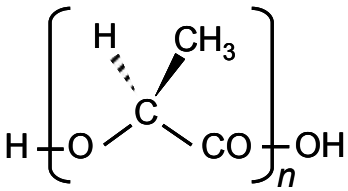
Biomaterials Engineering and Biocatalytic Engineering

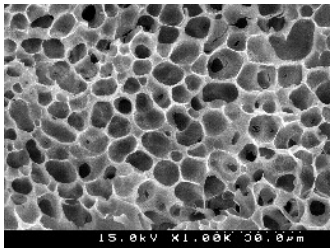
Research Fields of Interest

Biomaterials Engineering

- Biodegradable plastics are thought to be key materials to solve the plastic waste disposal problem because they are degradable in the natural environment and composting processes. Some of them are biobased materials ("biomass plastics") which save fossil resources and reduce the emission of carbon dioxide. In addition bioabsorbable materials, which are degraded and metabolized in the human and animal bodies, are used in drug delivery systems (DDS) and tissue engineering.

  Dr. Tanaka's Research Group studies formation of porous membranes and particles of biodegradable plastics (poly(lactic acid) (PLA), poly(1,4-butylene succinate) (PBS), poly(ε-caprolactone) (PCL), etc.) to develop high performance biodegradable plastics.





Microporous membrane of poly(L-lactic acid) formed via phase separation.

Biocatalytic Engineering

- Enzymes and cells are biocatalyses which are used in biochemical industries. They catalyses formation of useful compounds and degradation of toxic substances at normal temperature and pressure.

  Dr. Tanaka's Research Group studies degradation of toxic phenolic compounds by an enzyme, laccase (EC 1.10.3.2). Laccase oxidizes phenolic compounds with the aid of dissolved oxygen in water. The enzyme does not need toxic oxidants such as hydrogen peroxide in the oxidation. The laccase can also be used in the synthesis of lignin-like polymethoxyphenols without toxic hydrogen peroxide or organic solvents.

Education

1996: Ph.D. in Agriculture, Kyoto University, Japan
1989: M.S. in Engineering, Kyoto University, Japan
1987: B.S. in Agriculture, Kyoto University, Japan

Professional Societies and Activities

1. Society of Chemical Engineers, Japan
2. American Institute of Chemical Engineering
3. Society for Biotechnology, Japan
4. Japan Society for Food Engineering
5. Membrane Society of Japan
6. Chemical Society of Japan
7. Society of Polymer Science, Japan

Awards

1. Excellent Paper Award of Japan Society for Food Engineering, 2010
2. Excellent Paper Award of the Society for Biotechnology, Japan, 2009
3. Incentive Award, Japan Society for Food Engineering, 2007
4. Best Presentation Award, Japan Society of Food Engineering, 2006

Major Publications

Papers

Biomaterials Engineering

[1] "Formation of poly(L-lactic acid) microfiltration membranes via thermally induced phase separation," *J. Membr. Sci.*, vol. 238, pp. 65-73, 2004

[2] "Production of D-lactic acid from defatted rice bran by simultaneous saccharification and fermentation," *Biores. Technol.*, vol. 97, pp. 211-217, 2006

[3] "Microfiltration membrane of polymer blend of poly(L-lactic acid) and poly(ε-caprolactone)", Desalination, vol. 193, pp. 367-374, 2006

[4] "Production of laccase by membrane-surface liquid culture of Trametes versicolor using a poly(L-lactic acid) membrane," *Biochem. Eng. J.*, vol. 33, pp. 188-191, 2007

[5] "Microporous foams of polymer blends of poly(L-lactic acid) and poly(ε-caprolactone)," *Desalination*, vol. 234, pp. 175-183, 2008

[6] "Mechanical properties of microporous foams of biodegradable plastic," *Desalination Water Treatment*, vol. 17, pp. 37-44, 2010

[7] "Formation of microporous membranes of poly(1,4-butylene succinate) via nonsolvent and thermally induced phase separation," *Desalination Water Treatment*, vol. 17, pp. 176-182, 2010

[8] "Improved adhesion of human cultured periosteal sheets to a porous poly(L-lactic acid) membrane scaffold without the aid of biomolecules," *J. Biomed. Mater. Res. A*, vol. 98, pp. 100-113, 2011

[9] "Formation of depth filter microfiltration membranes of poly(L-lactic acid) via phase separation," *J. Membr. Sci.*, vol. 396, pp. 101-109, 2012

[10] "Microporous membranes of PLLA/PCL blends for periosteal tissue scaffold," *Mater. Lett.*, vol. 95, pp. 103-106, 2013

Biocatalytic Engineering

[1] "Enzymatic degradation of alkylphenols, bisphenol A, synthetic estrogen and phthalic ester," *Water Sci. Technol.*, vol. 42(7-8), pp. 89-95, 2000

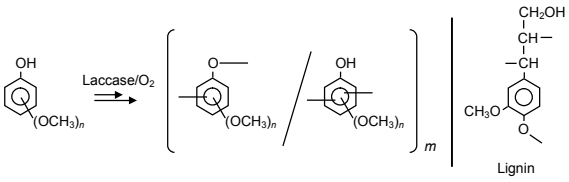
[2] "Treatment of model soils contaminated with phenolic endocrine-disrupting chemicals with laccase from *Trametes* sp. in a rotating reactor," *J. Biosci. Bioeng.*, vol. 92, pp. 312-316, 2001

[3] "Enzymatic oxidative polymerization of 4-chloroguaiacol by laccase," *J. Chem. Eng. Jpn.*, vol. 36, pp. 1101-1106, 2003.

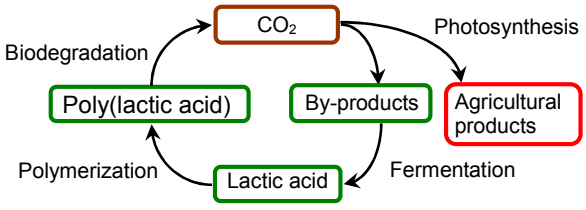
[4] "Treatment of nonylphenol with laccase in a rotating reactor," *J. Biosci. Bioeng*., vol. 96, pp. 541-546, 2003

[5] "Enzymatic treatment of estrogens and estrogen glucuronide," *J. Environ. Sci.*, vol. 21, pp. 731-735, 2009

[6] "Enzymatic oxidative polymerization of methoxyphenols," *Chem. Eng. Sci.*, vol. 65, pp. 569-573, 2010



Synthesis of lignin-like biodegradable polymers by enzymatic oxidative polymerization of methoxyphenols with laccase.



Biomass plastics in industries and the natural environment.