

## **NatureWorks Ingeo™ Polylactide (PLA) Biopolymer: The Past, Present and Future Revisited**

**Richard C. Bopp, Ph.D.**

**Consulting Materials Scientist**

NatureWorks Ingeo PLA resin is arguably the most successful commercial biopolymer to serve side-by-side commodity thermoplastics in history. Moreover, PLA is finding increasing utility in an ever growing array of applications ranging from compostable food service wear to shrink wrap films to fine textiles and, even most recently, to 3D printing filament. In this presentation we discuss the history of the PLA business with special focus on Cargill's daring 1989 EcoPLA venture and progressing through a series of joint ventures which have led to today's NatureWorks business. Working as a senior materials scientist at Cargill and NatureWorks from 1996 to 2014, the author provides his firsthand perspective of the commercialization and growth of this remarkable business. The presentation will conclude with a discussion of current plans for the future of PLA and compare that to projections made in 2012 during his last visit to Texas State University.

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# **From Technician to Senior Materials Scientist: A 50 year Journey of Inquiry and Learning**

**Richard C. Bopp, Ph.D.  
Consulting Materials Scientist**

Dr. Richard C. Bopp is a consulting scientist with over 50 years' research experience starting as a quality control technician at a papermaker felt company after dropping out of college in 1965 and retiring from NatureWorks LLC as a senior materials scientist in 2014. Dick earned his B.S., M.S. and Ph.D. degrees with the support of his wife, Virginia, and their two children. In this informal presentation, Dick will discuss some of the events, planned and unplanned, that propelled him to positions of increasing responsibility throughout his lengthy career.

**Consulting Materials Scientist  
RC Bopp Associates LLC  
Richard C. Bopp, Ph.D.**

Richard C. Bopp is a consulting materials scientist with over 40 years' experience. He retired in 2014 from NatureWorks LLC where he worked on the process and product development of Ingeo™ polylactide biopolymers. Particular areas of research interest were PLA nucleation and crystallization, thermoforming, injection stretch blow molding, nanocomposite technology, biotoner development and recycling.

Prior to his 18 years at NatureWorks, Dick worked at the General Electric Co. for 21 years, starting at the GE Corporate Research and Development Center and continuing at the GE Plastics PPO Technology Department in Selkirk, NY. At GEP Dick led a variety of development programs including microwaveable NORYL™ food packaging, GECET™ expandable foam and UV stabilization. In 1992 he was the recipient of GE's Don Jaquiss Award for his development of a flame retarded Noryl resin for a McDonald's roof made from post-consumer recycled computer housings. In 1993 he was named Noryl Recycle Business Leader.

Dick earned his bachelor's degree in chemistry from the State University of New York at Albany and his M.S. and Ph.D. degrees in polymer chemistry from Rensselaer Polytechnic Institute in Troy, NY.

Active in the Society of Plastics Engineers since 1975, he is past president of the Upper Midwest and Hudson Mohawk Sections. He has served on the Engineering Properties and Structures Division board since 2000 and councilor for the Plastics Environmental Division in 2013. He was elected SPE Fellow in 2011 and inducted into the Plastics Pioneers Association in 2012.

He has authored or co-authored numerous technical papers and holds over 20 U.S. patents.

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