

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Borealis AG
Petitioner

v.

Berry Plastics Corporation
Patent Owner

Case IPR2016-00235
Patent 8,883,280

DECLARATION OF KRISHNAMURTHY JAYARAMAN, PH.D.

I, Krishnamurthy Jayaraman, declare as follows:

I. INTRODUCTION

1. I have been retained on behalf of Borealis AG (“Petitioner”) as an independent expert consultant in this proceeding before the United States Patent and Trademark Office. Although I am being compensated at my usual rate of \$300 per hour for the time I spend on this matter, no part of my compensation depends on the outcome of this proceeding, and I have no other interest in this proceeding.

2. I understand that this proceeding involves U.S. Patent No. 8,883,280 (“the ’280 patent”) (Ex. 1001).

3. I have been asked to consider whether the subject matter of claims 1-14, 36-42, 44-48, 51-54, 61, 62, 65, and 66 of the ’280 patent was known or would have been obvious to a person of ordinary skill in the art. My opinions are set forth below.

II. QUALIFICATIONS

4. A copy of my resume is attached as Appendix A and includes details of my educational, professional, research, and employment credentials. A summary, which focuses on my experience relating to polypropylene blends and polymer foam processing, is set forth below.

5. I am a Professor in the Chemical Engineering & Materials Science Department at Michigan State University in East Lansing, Michigan. For the last

40 years, I have taught courses in chemical engineering and polymer sciences, including structure, processing, and properties of polymers and composites.

6. I obtained a Bachelor of Science degree in chemical engineering from Indian Institute of Technology in Kanpur, India in 1971. I obtained a Ph.D. in Chemical Engineering from Princeton University, New Jersey, USA, in 1975.

7. After receiving my Ph.D., I was appointed as a Visiting Assistant Professor in the department of chemical engineering at University of Washington in Seattle, WA, between 1975 and 1976. In 1976, I joined the Chemical Engineering Department at Michigan State University as an Assistant Professor. Between 1981 and 1993, I was promoted to Associate Professor, then to Professor in the same department. Between 1985 and 1986, I was awarded a year-long National Research Council Senior Research Associateship at the National Institute of Occupational Safety and Health (NIOSH) laboratory in Morgantown, WV. In 1999, I was recognized as the Withrow Distinguished Scholar in the College of Engineering at Michigan State University. I have supervised the thesis research of 20 doctoral students and 18 master's students.

8. My areas of expertise include melt processing, solid-state processing, and rheological characterization of polymeric foams, polymer composites and nanocomposites, and thermoplastic elastomers.

9. During my research career, I have made many contributions to the development of polypropylene blends and structures suitable for various applications. I have co-authored over seventy publications, including publications related to polypropylene, polyethylene, their copolymers and thermoplastic polyolefin (TPO) blends, and also publications related to polypropylene foams and polypropylene nanocomposites.

10. I am a co-inventor of four patents, and one pending published patent application on polypropylene foams with nanoclay. I am also a co-inventor of two provisional patent applications on polypropylene films and foams.

11. I also have delivered invited lectures and keynote speeches, focusing on polypropylene, polypropylene blends, polypropylene foams and nanocomposites, including:

- “Extrusion of Oil Extended Thermoplastic Vulcanizates,” in the Symposium on Elastomers and Elastomer Processing at the 20th International Polymer Processing Society Meeting, Akron, OH, in 2004;
- “Extensional Melt Flow of Polypropylene-Layered Silicate Nanocomposites with Variations in Coupling Agent, Loading and Temperature,” in the Symposium on Nanostructured Materials at the

24th International Polymer Processing Society Meeting, Salerno, Italy, in 2008; and

- “Development of Crystalline Texture during Die-Drawing of Expanded Polypropylene-Talc Composites and Neat Polypropylene,” in the Gunter Gottstein Symposium on Texture of Materials at Thermec '13, Las Vegas, USA, in 2013.

12. I have also collaborated with and consulted for private companies, government agencies, research organizations, and attorneys' clients, such as ExxonMobil Chemical Co., Dow Chemical Co., Lyondell-Basell, Advanced Elastomer Systems, Siemens, BASF, Summit Polymers, North Coast Innovation, Petoskey Plastics, Nanocor, ViChem Industries, and Eovations LLC. I have also collaborated with the US Army Tank Automotive Command on the manufacturing of polymer composite products for military applications.

13. In my consulting activities, my work has included teaching related to rheological tests to understand flow and deformation, as well as flow-induced microstructure of polypropylene, polyethylene, copolymers of ethylene and propylene with other olefins and TPO as well as their foams, composites, and nanocomposites. I have also provided technical analysis of flow marks in injection molding, processing, and rheology of polymer-clay nanocomposites, foamed

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