

Dear Professor Gather, dear dean Prof. Lütz, dear colleagues and friends, dear Ladies and Gentlemen,

It is my pleasure to present the laudatio for Greg Stephanopoulos, for the honorable doctorate of the Bio- and Chemical Engineering faculty of the TU Dortmund University. According to the statutes of the faculty, the honorable doctorate is for outstanding achievements in the development of biochemical engineering research and recognition of life time contributions.

You as the faculty are celebrating in 2019 50 years of Bio- and Chemical Engineering here in Dortmund. Most of you know about the broadening of the faculty in the year 2003 from chemical engineering only, and some of you were crucially involved in this very successful development. Professor Stephanopoulos was a “bit” quicker than the BCI to identify that the concepts and methodologies of chemical engineering can contribute significantly to the development of biotechnology and beyond. But first things first.

Born in 1950 in Greece, Greg Stephanopoulos studied chemical engineering at the National Technical University of Athens finishing with a diploma and moved on to the University of Florida, where he received his master degree. He earned his PhD on modelling population dynamics at the University of Minnesota and became an assistant professor of chemical engineering at the California Institute of Technology in 1978, with a promotion to associate professor in the same year. Just on the side, the average age to become a professor in Germany is currently about 40. Truly something to think about. In 1985 Stephanopoulos became professor of chemical engineering at the Massachusetts Institute of Technology, the MIT, where he still is a professor today. His academic training is responsible for the rigor of his work, while his enthusiasm and curiosity are responsible for the broad scope of his many different contributions.

In his career, Greg Stephanopoulos made important contributions in the fields of biochemical engineering and applied microbiology – subjects which in modern terms we attribute to Metabolic Engineering and Synthetic Biology. As a reviewer states: “Greg combines sophisticated analysis at a systems level with detailed biochemical knowledge and astute engineering intuition to achieve unprecedented results.” For example, he already at the beginning of the 1990st investigated the industrially important lysine production with *Corynebacteria* using the concept of metabolic flux balancing. The chemical engineering basics of mass and energy balances were clearly fostering this research. The lessons learned during these studies allowed rational strain improvements, resulting in higher lysin production performance. Significant contributions to the production of small molecules, natural products and biopolymers from various feedstocks including the now much talked and worked on acetate are

only some examples of the many contributions. On a personal note, with much interest I followed the work on hyaluronic acid, as I spent not only 4 years in my PhD on this intriguing polysaccharide, but also could follow-up the research currently in my own lab. On the side, the analytics of hyaluronic acid are still challenging.

Greg Stephanopoulos is also well-known for pioneering non-rational approaches for improving microbes as cell factories. He invented global transcription machinery engineering to rewire the operation of metabolic networks. The ease of the approach and the ever more powerful phenotypisation of single cells, including mammalian cells, allows rapid progress in cell factory optimization. He himself contributed for example yeast that are more tolerant against their fermentation product, ethanol, thereby broadening the operational window of fermentation and subsequent downstream processing. Indeed, Prof. Stephanopoulos contributions to the production of biofuels are truly numerous, overcoming metabolic limitations in lipid synthesis and avoiding costly sterilisation by using rarely metabolized nitrogen or phosphorus sources as examples.

With the word of a reviewer: “Greg’s far-reaching impact also extends to the medical arena, where he has applied a diverse array of tools, including advanced mathematical and bioinformatic methods, to the elucidation of type 2 diabetes, insulin resistance, and cancer metabolism. Few researchers have had such a profound influence and broadened the scope of their fields to the extent that Greg has.”

Besides research contributions, Professor Stephanopoulos is a leader in education and supervision. As early as his first Professorship at Caltech, he received a teaching award and as one reviewer states “one of the best instructors ... —very knowledgeable, clear, and personally engaging”. For sure, the book metabolic engineering co-authored with Jens Nielsen and Aristos Aristidou contributed strongly to this development. From my own experience, working with an at that time young postdoc named Lars Keld Nielsen in the laboratory of Terry Papoutsakis at Northwestern on Metabolic Flux Analysis of butanol production by Clostridia, I enjoyed reading your publications on the mathematical description of lysine producing Corynebacteria. In 1998 during my PhD with Lars Nielsen, preparing for a metabolic engineering course run by Jens Nielsen at the Danish Technical University in Copenhagen, I spent many hours with your metabolic engineering book. I have to admit that being not familiar at all with the concepts of metabolic control analysis, I required quite some time to grasp at least the essentials of the subject. On the side, I am still using the book in my teaching, for example for black box modelling and metabolic flux analysis and as far as I know it is also still used here at the TU Dortmund University.

While Greg's teaching contributions are outstanding, his supervision and mentoring is one-of-a-kind. As one reviewer states "Greg's lasting influence on the field of biochemical engineering also includes an impressive list of successful alumni from his research group, many of whom have made their own important contributions as researchers and mentors in industry, national labs, and academia. Indeed, Greg's growing legacy comprises an unparalleled combination of outstanding contributions in research, education, and professional service."

I could stop here, but although this is a science and not a service award, Prof. Stephanopoulos service for the scientific community in general and the American Institute of Chemical Engineers in particular, of which he was president in 2016 also needs to be mentioned. He was instrumental for the foundation and running of the Society for Biological Engineering and more recently of founding the International Society for Metabolic Engineering. Professor Stephanopoulos was the founding editor of the journal Metabolic Engineering, which is THE journal of this vibrant research community. The journal Metabolic Engineering not only fosters the scientific discussion, but also strongly increased the communities visibility under his leadership. I personally met Prof. Stephanopoulos for the first time in 2000 at the Metabolic Engineering conference in Colorado Springs, a scientific meeting I will never forget. While Metabolic Engineering is the longest running conference series of its type, I assume you already guess who initiated it. Again, Prof. Stephanopoulos service to the scientific community is outstanding.

Finishing with a quote of a reviewer: "In summary, Greg Stephanopoulos has expanded and transformed the field of biochemical engineering in countless ways, and has helped advance metabolic engineering in particular from a nascent concept to a thriving discipline. He continues to discover, educate, and inspire at the highest levels."

Because of all these achievements and the many more I could not mention, I would like to congratulate you to the Honorary Doctorate of the TU Dortmund University. I wish you all the best for the future.