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22nd Heinz Awards Honors Joseph DeSimone for Leadership in Convergence Research that Integrates Life, Physical, Engineering Sciences

DeSimone's achievements include development of advanced technologies in green chemistry, nanoparticle fabrication, 3D printing and precision medicine

PITTSBURGH, September 14, 2017—The Heinz Family Foundation today named Joseph DeSimone, Ph.D., the recipient of the 22nd Heinz Award in the Technology, the Economy and Employment category. A chemist and expert in polymeric materials, Dr. DeSimone is honored for his achievements in developing and commercializing advanced technologies in fields such as green chemistry, nanoparticle fabrication, precision medicine and 3D printing, and for his leadership in convergence research, a new model integrating life, physical and engineering sciences to achieve innovations that positively impact human life in the areas of health, environment, energy and the economy.

As part of the accolade, Dr. DeSimone will receive an unrestricted cash award of \$250,000.

Dr. DeSimone's early work in green chemistry included the invention of new polymer synthesis methods that use supercritical (fluid state) carbon dioxide instead of hazardous solvents for creating fluoropolymers (Teflon-like plastics). Previously, such plastics could only be created using Freon or chlorofluorocarbons, which deplete the ozone layer. Dr. DeSimone's work in this area also led to the development of environmentally friendly processes that eliminate the need for harmful solvents in applications such as dry cleaning, degreasing, microelectronics and other coatings.

Most recently, in the area of advanced manufacturing, Dr. DeSimone is noted for the development of CLIP (Continuous Liquid Interface Production), a new technology that uses software to precisely tune the interaction of ultraviolet light and oxygen to rapidly create 3D printed parts. Dr. DeSimone and his team also developed "dual cure" resins that can be printed using CLIP and result in parts that have final properties, such as far superior strength and smooth surfaces, not seen before using previous 3D technologies. To bring these technologies out of the lab and into the marketplace, Dr. DeSimone co-founded Carbon, Inc., which is now working with manufacturing partners to develop applications for CLIP. With over 200 employees, Carbon has drawn more than \$220 million in investment to date from companies such as Google, GE and BMW. Most recently, it partnered with adidas to create a new running shoe called Futurecraft 4D, which has a lattice midsole that can be printed in 30 minutes, an impossible feat for traditional footwear manufacturing.

"At Carbon, we are inspired by what people can do with our developments, and we have brought a diverse set of people together for a common purpose—to make a difference," said Dr. DeSimone. "With CLIP and the parallel breakthrough we've made in the development of programmable liquid resins, we are changing the whole trajectory of how polymeric products are designed, engineered, made and delivered, from computer components and medical devices to running shoes and cars. 3D printing has had everyone's attention, and inspired a lot of people to innovate, but until now, it has been a frustratingly slow technology, without the quality or the materials to scale production. With our technology, the entire

dynamic of traditional manufacturing is changing. Instead of making many parts that then need to be assembled in order to create a final object, we are able to directly make the final product.”

Synthesizing the fields of biotechnology and chemistry with nanotechnology, Dr. DeSimone has also pushed the potential of nanomedicine with the invention of PRINT (Particle Replication in Non-wetting Templates). PRINT—a soft lithographic technique that fabricates tiny nanoparticles with precise control over shape, size, composition and surface chemistry—holds great potential for delivery of vaccines to prevent diseases such as malaria, dengue and tuberculosis, as well as for cancer therapeutics. To commercialize PRINT and bring the technology to the private sector, Dr. DeSimone co-founded Liquidia Technologies, which is working with the PATH Malaria Vaccine Initiative on next-generation inhalable vaccines and GSK to develop new medicines for treatment of pulmonary diseases. Liquidia was the first privately held biotech company to receive an equity investment from the Bill & Melinda Gates Foundation.

“Dr. DeSimone’s achievements as a polymer scientist and entrepreneur leading to singular breakthroughs in areas such as 3D printing, nanomedicine and green chemistry are many, and the positive effects on how we live, create, work and treat our planet are only just beginning to be seen,” said Teresa Heinz, Chairman of the Heinz Family Foundation. “We honor him with the Heinz Award in Technology, the Economy and Employment not only for these accomplishments, but also for his ability to work across the traditional boundaries of scientific discipline, and for taking knowledge gained out of the laboratory and into the places where it can have a positive impact.”

Dr. DeSimone’s labs at the University of North Carolina at Chapel Hill and North Carolina State University are also noted as advocates for the model of convergence research, and for diversity in the STEM fields, and he notes that “Silicon Valley has been very good with hardware, and very good with software, but not at working across the disciplines of hardware, software and chemistry.” While basic interdisciplinary research has been a part of industrial research labs since the 1920s, convergence is seen as a new, far more integrated merging of ideas, approaches and technologies that requires an open and inclusive scientific culture. As a prominent voice in this emerging practice, Dr. DeSimone led the National Academies of Sciences (NAS) effort that resulted in the 2014 National Research Council’s report, *Convergence: Facilitating Transdisciplinary Integration of Life Sciences, Physical Sciences, Engineering, and Beyond*, one of the top downloaded NAS reports that year.

“Diversity is a fundamental tenet of innovation. After all, we learn the most from those we have the least in common with,” said Dr. DeSimone. “It’s the differences across disciplines, perspectives, life experience, culture and gender coming together that culminate to drive new ways of thinking and problem solving.”

Established to honor the memory of U.S. Senator John Heinz, the 22nd Heinz Awards this year recognizes those who have made significant contributions in five distinct areas of great importance to Senator Heinz: Arts and Humanities; Environment; Human Condition; Public Policy; and Technology, the Economy and Employment. The Heinz Awards has recognized 133 individuals and awarded more than \$26 million to the honorees. For more information, visit <http://heinzawards.net/2017>.

In addition to Dr. DeSimone, the 22nd Heinz Awards honored the following individuals, who will receive their awards in Pittsburgh on October 18, 2017:

- **Arts and Humanities: Natasha Trethewey, Evanston, Illinois**
- **Human Condition: Angela Blanchard, Houston, Texas**
- **Environment: Gregory Asner, Ph.D., Stanford, California**
- **Public Policy: Mona Hanna-Attisha, M.D., Flint, Michigan**

EDITORS/REPORTERS: To obtain photos of Dr. DeSimone or any of the other recipients, please contact Abby Manishor at amanishor@burness.com or 917-539-3308.

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About the Heinz Awards

Established by Teresa Heinz in 1993 to honor the memory of her late husband, U.S. Senator John Heinz, the Heinz Awards celebrates the accomplishments and spirit of the Senator by recognizing the extraordinary achievements of individuals in the areas of greatest importance to him. The awards, administered by the Heinz Family Foundation, recognize individuals for their contributions in the areas of Arts and Humanities; Environment; Human Condition; Public Policy; and Technology, the Economy and Employment. Nominations are submitted by invited experts, who serve anonymously, and are reviewed by jurors appointed by the Heinz Family Foundation. The jurors make recommendations to the Board of Directors, which subsequently selects the Award recipients. For more information on the Heinz Awards, visit www.heinzawards.net.

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