

THE 2018 OLIVER MAX GARDNER AWARD

RUBEN G. CARBONELL

The Frank Hawkins Kenan Distinguished Professor of Chemical Engineering at NC State, Dr. Carbonell was a co-author of the proposal that led to the launch, in March 2017, of the National Institute for Innovation in Manufacturing Biopharmaceuticals (NIIMBL). Made possible by a five-year, \$70 million commitment from the National Institute of Standards and Technology, NIIMBL is dedicated to accelerating innovation in biopharmaceutical manufacturing and developing a world-leading workforce. This workforce will help drive the future of an industry vital to the U.S. economy and to patients worldwide who suffer from chronic and deadly diseases.

Dr. Carbonell's main area of research is molecular recognition and purification of biological molecules. In 2006, he and his colleagues published two landmark papers in the prestigious journals *Transfusion* and *The Lancet*, reporting for the first time the use of a novel resin to remove the infectious prion protein from whole blood. The prion protein is responsible for the transmission of bovine spongiform encephalopathy, or mad cow disease, in humans. This prion removal process is being used by Octapharma AG in Switzerland to reduce the risk of prion infection during transfusions of pooled human plasma. The prion removal step was implemented in the European Union several years ago, as well as in Canada and the United States. This revolutionary technique has been used in the treatment of thousands of patients with blood clotting diseases. In addition, Dr. Carbonell and his group created an innovative filter composed of nonwoven fabrics impregnated with these prion removal resin particles to remove infectious prion protein from whole blood prior to transfusions. This filter, manufactured by MacoPharma in Lille, France, has successfully passed clinical safety trials, and is ready to be deployed to address outbreaks of cases of mad cow disease.

During his career, Prof. Carbonell has mentored nearly 80 masters and doctoral students, and 40 postdoctoral and visiting researchers and has taught literally thousands of undergraduate students. Many of these individuals are now professors in leading institutions in the U.S. and other countries, including Princeton, Purdue, University of Colorado, University of Arizona, Florida State University, and the University of Bologna. Many others hold key technical and management positions in industrial firms such as Biogen, DuPont, Pfizer, KBI Biopharma, AbbVie, and Grifols.

In 2014, Dr. Carbonell was elected to the prestigious National Academy of Engineering, acknowledging his numerous scientific and technical contributions cited in over 240 publications. In 2016, he was elected a Fellow of the National Academy of Inventors in recognition of the breadth, range and quality of his patent portfolio, which includes nearly 40 U.S. patents and many more foreign counterparts. He is a Fellow of the American Institute of Chemical Engineers and the American Chemical Society's Industrial and Engineering Chemistry Division, and in 2007 received NC State's highest faculty award, the Alexander Quarles Holladay Medal. Because of the impact of years of research with collaborators from Slovenia and Italy, Dr. Carbonell was elected a foreign member of the Slovenian Academy of Sciences and Arts and of the Academy of Sciences of the Institute of Bologna.

As director of NC State's Kenan Institute for Engineering, Technology & Science, Dr. Carbonell established the *Kenan Fellows Program for Teacher Leadership*, an innovative effort to nurture teacher-leaders through a yearlong mentorship with university faculty and industry partners aimed at developing novel curriculum tools to introduce groundbreaking research to K-12 students. The National Science Foundation has recognized this as an excellent model for university outreach to schools, and several groups in other states are developing similar programs. Approximately 450 Kenan Fellows are now using their advanced skills in teaching over 20,000 students, training over 10,000 other teachers, and reaching out to nearly 20,000 members of their communities annually throughout most counties and school districts in North Carolina.

Dr. Carbonell received his bachelor's degree in chemical engineering from Manhattan College, and his master's degree and doctorate in chemical engineering from Princeton University. He spent ten years as a professor at the University of California, Davis before arriving at NC State in 1984.

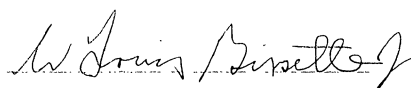
The Board of Governors is honored to name Dr. Ruben G. Carbonell, the Frank Hawkins Kenan Distinguished Professor of Chemical Engineering and Director of both the William R. Kenan, Jr. Institute for Engineering, Technology and Science, and the Golden LEAF Biomufacturing Training and Education Center at NC State University, as the recipient of the 2018 Oliver Max Gardner Award.



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