ENI AWARD 2013

New Frontiers of Hydrocarbons - Downstream Prize

Rajamani Krishna

Winner

Improving Process Technologies with Molecular Insights

Biography

Rajamani Krishna is a Professor at the University of Amsterdam, currently working at the Van 't Hoff Institute for Molecular Sciences.

After graduating at the University of Bombay, he obtained his PhD degree from the University of Manchester in 1975. He then spent nine years as researcher for the Royal Dutch Shell Laboratory, in Amsterdam. In 1984 returned to India where he was appointed Director of the Indian Institute of Petroleum.

The entire research career of Professor Rajamani Krishna has focused on investigation of physico-chemical phenomena at the molecular and microscopic levels, in order to improve technologies related to reaction and separation.

Professor Krishna's research interests range from molecular modelling, bubble and particle dynamics to reactor scale up to process synthesis. The main goal of this research concerns the development of unifying concepts in multicomponent diffusion and multiphase hydrodynamics, both in separations and reaction engineering. He has pioneered the development of the Maxwell-Stefan diffusion formulation and its application to fluid phases, porous solids, and complex three-phase (vapour-liquid-liquid) systems. The Krishna Group has investigated the hydrodynamics of various types of multiphase reactors, using the Computational Fluid Dynamics technique. Improved design procedures have been developed for bubble columns, slurry and air-lift reactors, gas-solid fluidized beds, catalytically structured reactors, distillation trays, and catalyst containing trays. Professor Krishna has also contributed to the understanding of the influence of low-frequency sound waves on gas and liquid flow in bubble columns.

His research activity provided many improvements in technologies concerning distillation, recovery of oil from shale, fluidized catalytic cracking, catalytic reforming, hydroprocessing, and hydrocracking. A major achievement has been the development of design and scale up procedures for Fischer-Tropsch slurry reactors.

Thanks to his wide experience, based both on his academic and industrial careers, Professor Krishna is recognised worldwide as a leading scientific expert. He has received several awards, which include the prestigious CONRAD Prize of the Dutch Institute of Engineers and the Akzo Nobel Science Award.