## The Role of Thermophysical Properties Knowledge in Mitigating Climate Change

Lourdes Vega<sup>C, S</sup>

Gas Research Center and Chemical Engineering Department, Khalifa University of Science and Technology -The Petroleum Institute, Abu Dhabi, United Arab Emirates Iveqa@pi.ac.ae

According to the monthly analysis of global temperatures carried out by scientists at NASA's Goddard Institute for Space Studies, July 2017 equaled statistically July 2016 as the warmest July in the 137 years in which the temperature has been monitored by modern record-keeping methods, while October 2017 was the second warmest October in the same 137 years period. It has been estimated that, if greenhouse gas emissions continue at the current rate, the temperature of the Earth's surface could exceed historical values before the year 2050, with potentially harmful effects on ecosystems and biodiversity, and threatening human livelihoods in the planet. These scientific facts force scientist and regulators to take some actions towards reducing the emissions of greenhouse gases and mitigating climate change. In this presentation, I will focus on how physical chemistry has helped in identifying some of these problems by the deep understanding of the behavior of greenhouse gases and the processes in which they are involved. After a general historical overview, I will provide some specific examples related to CO<sub>2</sub> capture and utilization, the development of new low global warming potential refrigerants and new sources of energy, as three complementary manners to reduce greenhouse gas emissions into the atmosphere. The three examples share in common how the understanding of thermophysical properties (from theory, simulations and experiments) can help to transfer the fundamental knowledge to the industrial implementation. Remaining challenges and opportunities will also be addressed.