IChemE

Fluid Separations
Special Interest Group

Guggenheim Medal Award and Webinar

10 June 2021 – 15:00 – 16:00 BST

The Guggenheim Medal for 2021 is awarded to Dr Carolyn Koh

Dr Carolyn Koh completed her BSc and PhD degrees from University of W. London and postdoctoral training at Cornell University by 1993.

Carolyn was a Reader at King's College, London University between 1993-2004.

After this, Carolyn joined the Colorado School of Mines as Professor of Chemical and Biological Engineering and Director of the Center for Hydrate Research.

Carolyn is a member of the Editorial Advisory Board of the ACS J. Chem. Eng. Data, US DOE Methane Hydrate Advisory Committee member, and served on the National Academies NRC committee assessing the US DOE National Methane Hydrate Program.

She is also an active member of the joint ASME-AIChE Committee on Thermophysical Properties and organized/chaired sessions of the joint ASME-AIChE Thermophysical Properties Conferences.

Carolyn is also a Fellow of RSC and Associate Editor of the Society for Petroleum Engineers Journal.

EFREE

Carolyn has been elected co-Chair and Chair of the Gordon Research Conferences on Gas Hydrates in 2016 and 2018, respectively.

Carolyn was a consultant for the Gas Research Institute in Chicago

Carolyn has been visiting Professor at Cornell, Penn State and London University.

Carolyn has established internationally recognized gas hydrate research programs over the last two decades at King's College, University of London and the Colorado School of Mines.

Carolyn's research is focused on understanding the nucleation, crystallization and inhibition mechanisms and thermophysical properties of natural gas hydrates.

Carolyn was awarded the Young Scientist Award of the British Association for Crystal Growth, the CSM Outstanding Faculty Member Award, Senior Class (2013) and Young Faculty Research Excellence Award (2012).

Carolyn has over 130 publications in refereed journals, including Science, Physics Today, J. American Chemical Society, and two books, including Clathrate Hydrates of Natural Gases (the "third edition of a best seller" – quote from CRC Press publishers, co-authored with E.D. Sloan).

Chem Eng Mines information

Natural gas hydrates are crystalline inclusion compounds, which are capable of hosting small molecules inside the cages of a hydrogen-bonded water framework. Hydrates of natural gas present a potential hazard to the oil and gas industries when they form in subsea oil/gas flowlines. On the other hand, they also have technological importance in energy recovery, transportation and storage. We have recently demonstrated (Science 2004) that hydrogen molecules can be stored in binary H2/THF (tetrahydrofuran) clathrate hydrates at pressures nearly two orders of magnitude lower than that in pure hydrogen hydrates. This decreased pressure makes binary clathrate hydrates a potentially feasible hydrogen storage material, with a unique combination of advantages not found in any other class of materials.

The ultimate goal of our research is to advance our understanding of the nucleation, crystallization, and agglomeration mechanisms for natural gas hydrates. The results will have immediate relevance to flow assurance in gas/oil flowlines, and energy transportation and storage. Specifically we are aiming to (a) develop molecular-scale models of the aqueous structures which occur in solution immediately prior to and during the growth of gas hydrates, (b) investigate the effects of inhibitor and promoter molecules on these local structures, and, (c) using these data, identify possible pathways which may occur in the process of hydrate formation. This program combines microscopic (vibrational spectroscopy and neutron diffraction coupled to computer simulations) and macroscopic measurements (differential scanning calorimetry) to provide mechanistic information on hydrate nucleation, growth, and decomposition. The different methods help assure correct interpretation of the measurements and provide a solid foundation for accurate model development.