A Multiscale Approach to Analyze Adsorption Systems for Carbon-Neutral Technology

Saha, Bidyut Baran
Mechanical Engineering, Kyushu University : Professor

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Keynote Speakers

Bidyut Baran Saha
Professor, Mechanical Engineering
Kyushu University, Japan
E-mail: saha.baran.bidyut.213@m.kyushu-u.ac.jp

Short Biography

Prof. Bidyut Baran Saha obtained his B.Sc. (Hons.) and M.Sc. degrees from Dhaka University of Bangladesh in 1987 and 1990, respectively. He received his Ph.D. in 1997 from the Tokyo University of Agriculture and Technology, Japan. He worked as an Associate Professor at the Interdisciplinary Graduate School of Engineering Sciences of Kyushu University until 2008. He worked as a Senior Research Fellow at the Mechanical Engineering Department of National University of Singapore prior to joining the Mechanical Engineering Department of Kyushu University in 2010 as a Professor. He joined the Kyushu University Program for Leading Graduate School, Green Asia Education Center in March 2013 as a Professor. Currently, he has been working as a Professor and Principal Investigator at the International Institute for Carbon-Neutral Energy Research (WPI-I2CNER) in the Division of Thermal Science and Engineering. His main research interests are thermally powered sorption systems, heat and mass transfer analysis, and energy efficiency assessment. He has published more than 300 articles in peer-reviewed journals and international conference proceedings. He has edited four books and holds 14 patents. Recently, he served as the Managing Guest Editor for Applied Thermal Engineering and Heat Transfer Engineering journals, and Editor-in-Chief of Evergreen. He has organized and chairman of the International Conference on Innovative Materials for Processes in Energy Systems (IMPRES) conferences.

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Abstract

Large quantity of fossil fuel is consumed for domestic and industrial cooling/heating (c/h) applications which results in significant amount of CO_2 emission in the process. Thermally driven adsorption c/h systems are capable of reducing a considerable fraction of CO_2 emission by recovering low temperature waste heat which otherwise would have been purged to the ambient. Additionally, adsorption systems can be used for poly-generation, e.g. cooling, hot water supply and desalination which is an added boon. Analysis of these systems require an understanding of various phenomena at different scales: i) fundamental

adsorption phenomena at granular level, ii) heat and mass transfer within adsorption/desorption heat exchangers and iii) the overall dynamics of adsorption systems. The present talk will describe the combined experimental, theoretical and computational efforts being carried out by my research team in this direction. Fig. 1 shows the adsorption process at the various scales. The aim is to improve our overall understanding of adsorption science and technology which can lead to highly efficient, cost effective and practical c/h or polygeneration systems for various thermal applications and paving a path for carbon neutral society.

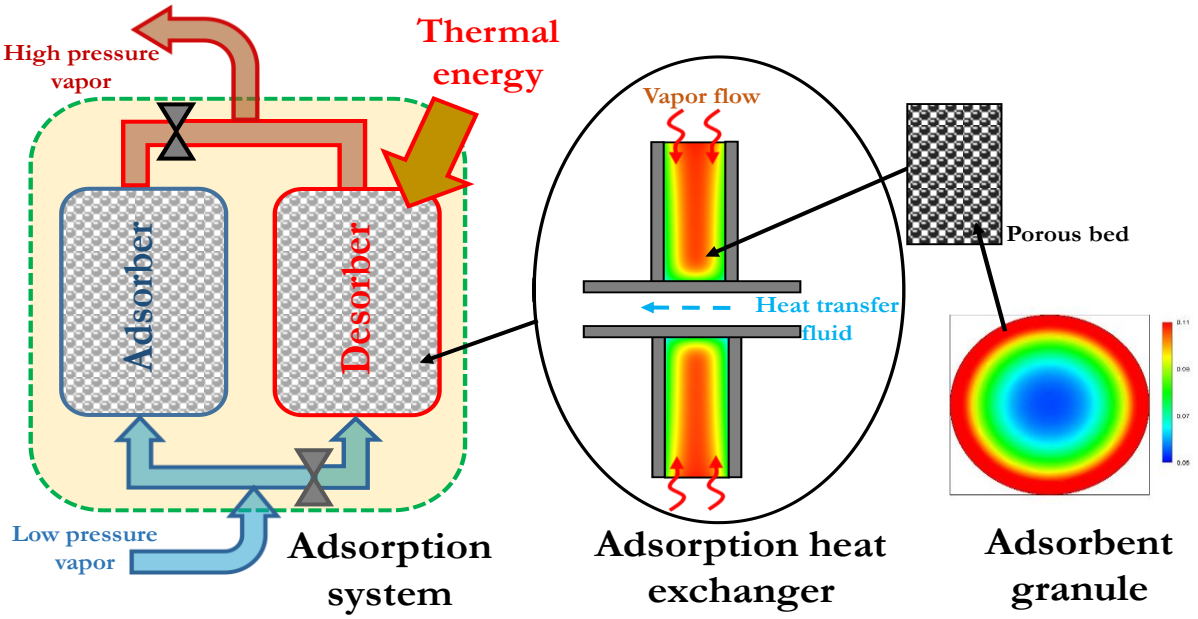

Fig.1. Adsorption process from micro to macro scale