Nanotechnology - Nanochannels; Study Data from China University of Petroleum Update Understanding of Nanochannels (Mesoscopic Method To Study Water Flow In Nanochannels With Different Wettability)

508 words
31 August 2020
Nanotechnology Weekly
NANOWK
1325
English

2020 AUG 31 (VerticalNews) -- By a News Reporter-Staff News Editor at Nanotechnology Weekly -- A new study on Nanotechnology - Nanochannels is now available. According to news reporting originating from Beijing, People's Republic of China, by VerticalNews correspondents, research stated, "Molecular dynamics (MD) simulations is currently the most popular and credible tool to model water flow in nanoscale where the conventional continuum equations break down due to the dominance of fluid-surface interactions. However, current MD simulations are computationally challenging for the water flow in complex tube geometries or a network of nanopores, e.g., membrane, shale matrix, and aquaporins."

Financial supporters for this research include National Natural Science Foundation Projects of China, National Science and Technology Major Projects of China, Science Foundation of China University of Petroleum, Beijing, NanoGeosciences lab, Mudrock Systems Research Laboratory at the **Bureau of Economic Geology**, China Scholarship Council (CSC).

Our news editors obtained a quote from the research from the China University of Petroleum, "We present a novel mesoscopic lattice Boltzmann method (LBM) for capturing fluctuated density distribution and a nonparabolic velocity profile of water flow through nanochannels. We incorporated molecular interactions between water and the solid inner wall into LBM formulations. Details of the molecular interactions were translated into true and apparent slippage, which were both correlated to the surface wettability, e.g., contact angle. Our proposed LBM was tested against 47 published cases of water flow through infinite-length nanochannels made of different materials and dimensions-flow rates as high as seven orders of magnitude when compared with predictions of the classical no-slip Hagen-Poiseuille (HP) flow. Using the developed LBM model, we also studied water flow through finite-length nanochannels with tube entrance and exit effects. Results were found to be in good agreement with 44 published finite-length cases in the literature."

According to the news editors, the research concluded: "The proposed LBM model is nearly as accurate as MD simulations for a nanochannel, while being computationally efficient enough to allow implications for much larger and more complex geometrical nanostructures."

For more information on this research see: Mesoscopic Method To Study Water Flow In Nanochannels With Different Wettability. Physical Review E, 2020;102(1):. Physical Review E can be contacted at: Amer Physical Soc, One Physics Ellipse, College Pk, MD 20740-3844, USA. (American Physical Society - www.aps.org/; Physical Review E - pre.aps.org)

The news editors report that additional information may be obtained by contacting Tao Zhang, China University of Petroleum, Key Lab Petr Engn, Ministry of Education, Beijing 102249, People's Republic of China. Additional authors for this research include Xiangfang Li, Keliu Wu, Farzam Javadpour, Jing Li and Ying Yin.

Keywords for this news article include: Beijing, People's Republic of China, Asia, Emerging Technologies, Nanochannels, Nanotechnology, China University of Petroleum.

Document NANOWK0020200831eg8v000tn

