

Water transport in confined nanospace

Hirofumi Daiguji

The University of Tokyo, 7-3-1 Hongo, Bunkyo-ku, Tokyo, Japan

The analysis and control of water transport in confined nanospace is important in applications such as biochemical analysis, power generation and environmental protection. In this talk, I will describe ongoing works of nanoscale water transport in our group. Specifically, I will present our recent theoretical and experimental works of water transport in porous silicates [1-3]. In addition, I will present the application of nanospace materials including mesoporous silica and metal organic frameworks to water vapor adsorption [4]. To evaluate the adsorption properties of porous materials, we usually use the adsorption isotherms and relaxation curves. The adsorbed mass of water vapor per unit mass of porous materials is measured with respect to the relative humidity and time, respectively. By using well-defined porous materials, not only the effect of pore diameter but also the effect of pore length on the relaxation curves is clarified and the water flux in each pore is evaluated. Finally, I will briefly outline how the knowledge of nanoscale water transport can be used for future development of porous materials and how the developed porous materials can be applied to the macroscale dehumidifiers and other macroscale applications.

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