

Molecular dynamics under confinement to one dimension: Options of measurement and accessible information

Kärger J., Valiullin R., Vasenkov S.

Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia

Abstract

Two types of host systems for one-dimensional molecular arrangements are considered, namely zeolites containing one- and two-dimensional arrays of channels of sub-nanometre dimension and porous silicon with channel diameters in the range of a few nanometres. After a discussion of the potential of zeolites as host systems, in particular for molecular arrangements under the conditions of single-file diffusion and of molecular traffic control, actual diffusion measurements by means of pulsed-field gradient NMR and interference/IR microscopy are shown to reveal substantial differences between the real and ideal zeolite structure. In contrast, porous silicon with one-dimensional channel arrays is successfully exploited as a host system allowing the experimental observation of such most important features of molecular confinement like hysteresis in mesoscale systems and surface diffusion. Thus, the attainable experimental insight offers promising conditions for a comparison of the results with those of the theoretical treatment of the observed phenomena. © IOP Publishing Ltd and Deutsche Physikalische Gesellschaft.

<http://dx.doi.org/10.1088/1367-2630/7/1/015>
