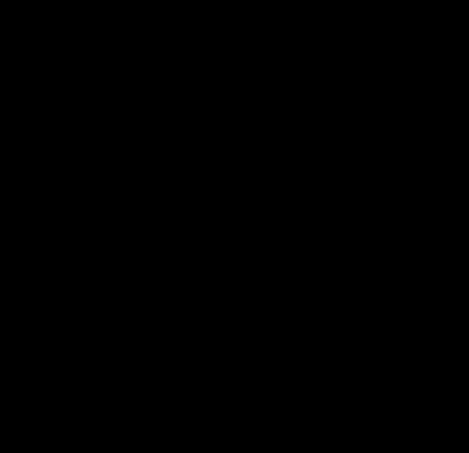
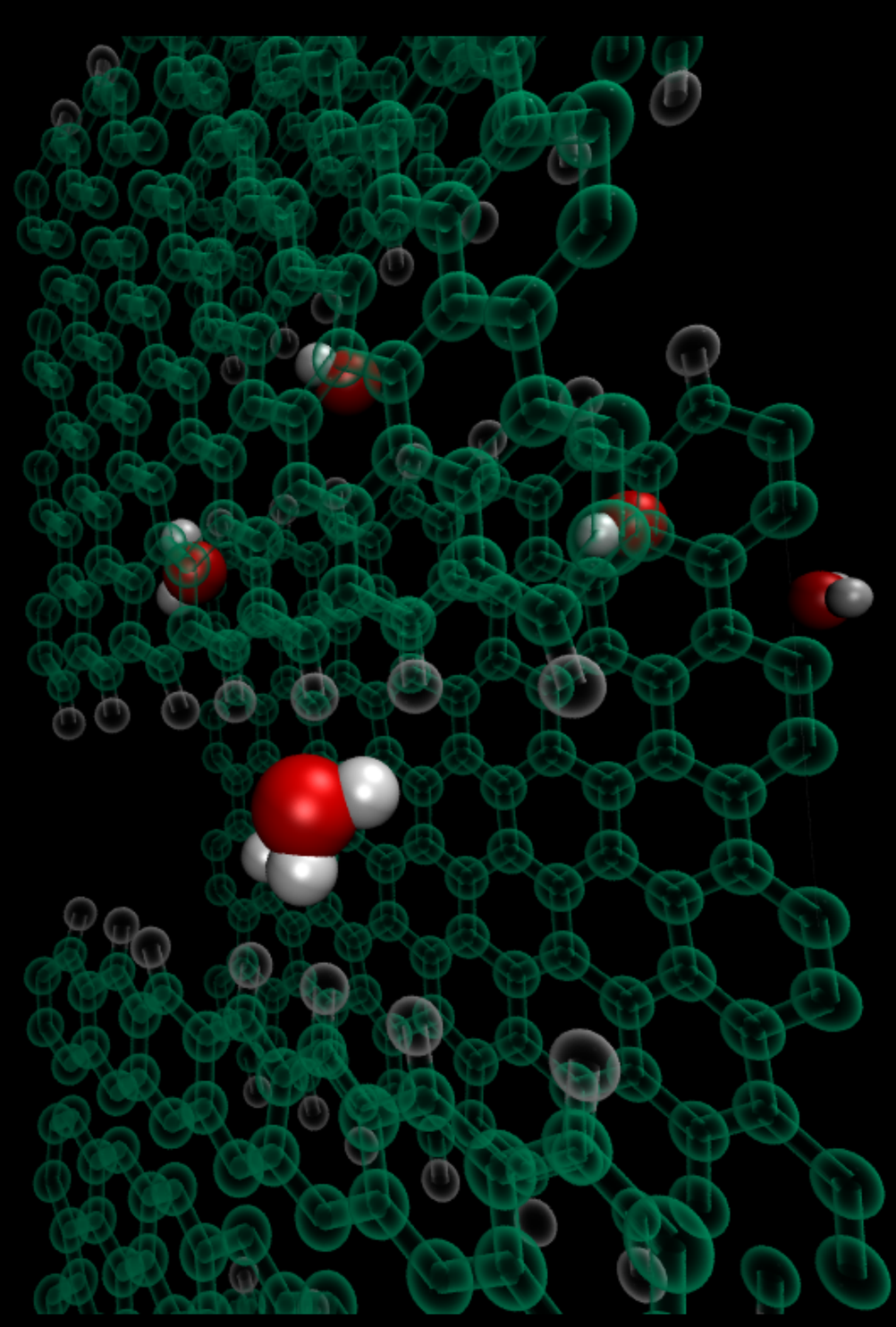
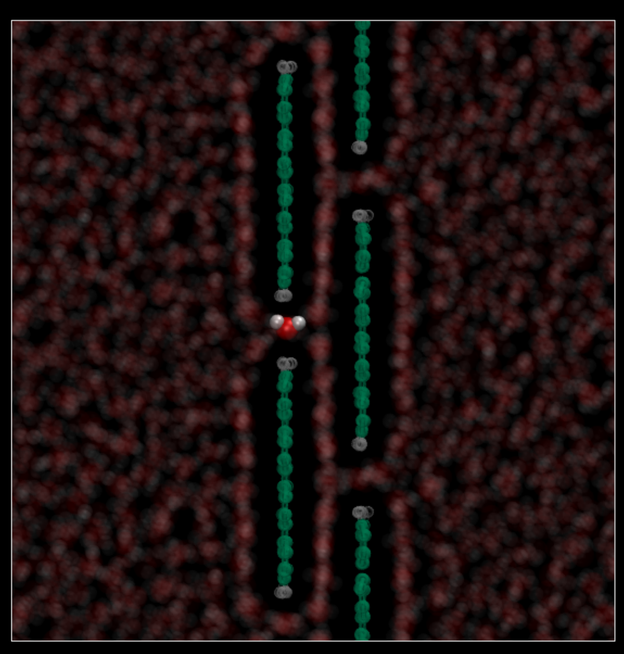
Journey of a water molecule through a graphene-based membrane

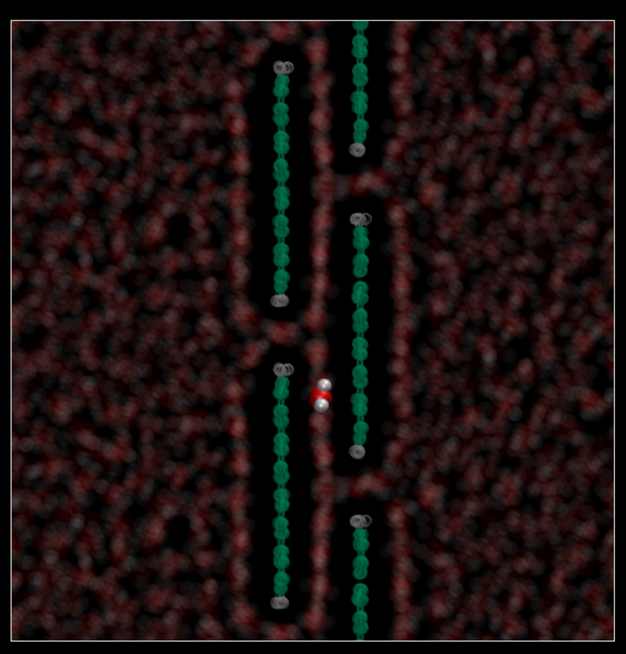
Frederike Jaeger, Jordan Muscatello, Omar K. Matar, Erich A. Müller
Department of Physics & Department of Chemical Engineering
Imperial College London



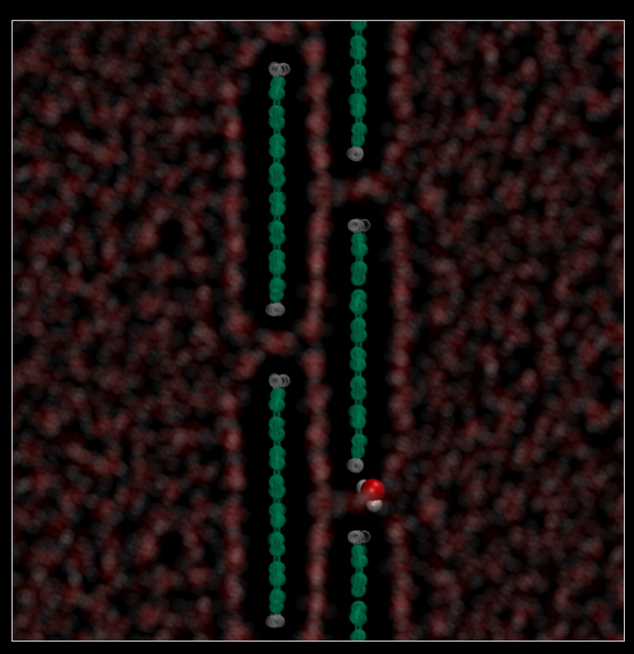




When entering the membrane, the water molecule has to overcome an energy barrier. This is due to the necessary breaking of hydrogen bonds when a molecule is removed from the bulk.



The water molecule remains within the membrane for an extended period of time, forming an ordered monolayer. This restructuring increases the energy penalty associated with traversing the membrane and can be used for filtering purposes.



Finally, another energy barrier needs to be overcome when leaving the membrane. For larger slit openings the barrier disappears.