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Dynamics of Water Confined in Partially Hydrophobic Nanosized Cylindrical Sieves ANTONIO FARAONE, NIST Center for Neutron Research and University of Maryland, YANG ZHANG, Massachusetts Institute of Technology, KAO-HSIANG LIU, CHUNG-YUAN MOU, National Taiwan University, SOW-HSIN CHEN, Massachusetts Institute of Technology — Using three high resolution quasielastic neutron scattering spectrometers we have investigated the single particle dynamics of water confined in a hydrophobically modified MCM-41-S sample. This latter is a silica matrix containing cylindrical sieves with diameter < 20 Å arranged in a hexagonal geometry. In the hydrophobically modified sample some of the sylanol groups in the pores' wall have been substituted with methanol groups resulting in a partially hydrophobic confining surface, which could be used as a model system. We have been able to analyze the data in the temperature range from 300 K to 210 K using a single consistent model, the Relaxing Cage Model (RCM) for the dynamics of supercooled water. Because of the heterogenous environment experienced by the water molecules in the pores, the relaxational dynamics show a broad distribution of relaxation times. However, the Fickian diffusive behaviour is retained. The obtained results help clarify the role that the chemical interaction between the water molecules and the walls of the confining host plays in determining the characteristics of the water dynamics, as compared to purely geometric constraints such as the size and shape of the pores.

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