

Reversible Wetting in Nanopores for Thermal Expansivity Control: From Extreme Dilatation to Unprecedented Negative Thermal Expansion

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ABSTRACT: In this work a general thermodynamic grounds as well as experimental verification are given to demonstrate how a reversible wetting process of a liquid in nanopores provoked by a temperature variation can be used to develop systems with the necessary thermal expansion behavior. Thermal expansion coefficients of such nanoporous heterogeneous lyophobic systems can be controlled in the unprecedentedly wide range of both negative and positive values. Perspectives as well as challenges on the full potential use of the proposed mechanism are identified.

