Electronic Supplementary Material (ESI) for Soft Matter.

From Monomers to Self-Assembled Monolayers: The Evolution of Molecular Mobility with Structural Confinements

Alexandre Dhotel,[†,‡] Ziguang Chen,[‡] Jianing Sun,[§] Boulos Youssef,[†] Jean-Marc Saiter,[†] Andreas Schönhals,[||] Li Tan,[‡,] Laurent Delbreilh,[†,*]*

† AMME—LECAP, EA4528, Institut des Matériaux de Rouen, Université et INSA de Rouen, B.P. 12, 76801 Saint Etienne du Rouvray Cedex, France

‡ AMME—A-TEAM, Department of Mechanical and Materials Engineering, University of Nebraska, Lincoln, Nebraska, 68588, USA

§ J. A. Woollam Co., Inc. 645 M Street, Lincoln, NE, 68508

|| Federal Institute for Materials Research and Testing (BAM), Unter den Eichen 87, D-12200 Berlin, Germany

* Address correspondence to (LT) ltan4@unl.edu; (LD) laurent.delbreilh@univ-rouen.fr

Self-assembled monolayers, dielectric spectroscopy, molecular mobility, stimuli-responsive material

Supporting Information.

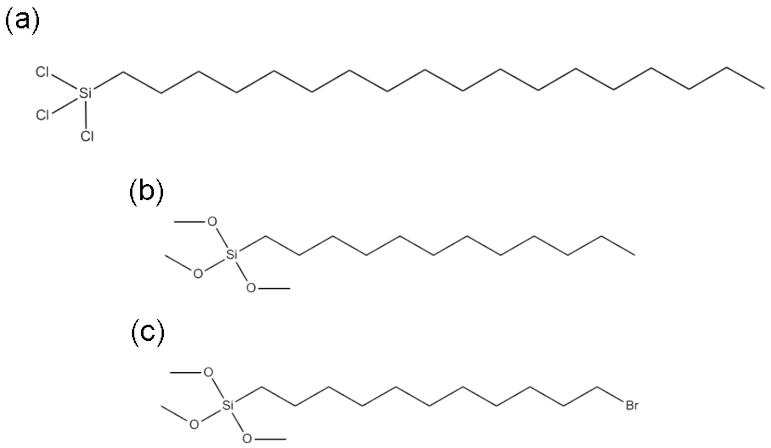

Figure SI-1. Chemical formulae of monopolar (a) octadecyltrichlorosilane (OTS), (b) dodecyltrimethoxysilane (DTMS), and bipolar (c) 11-bromoundecyltrimethoxysilane (BUDTMS)

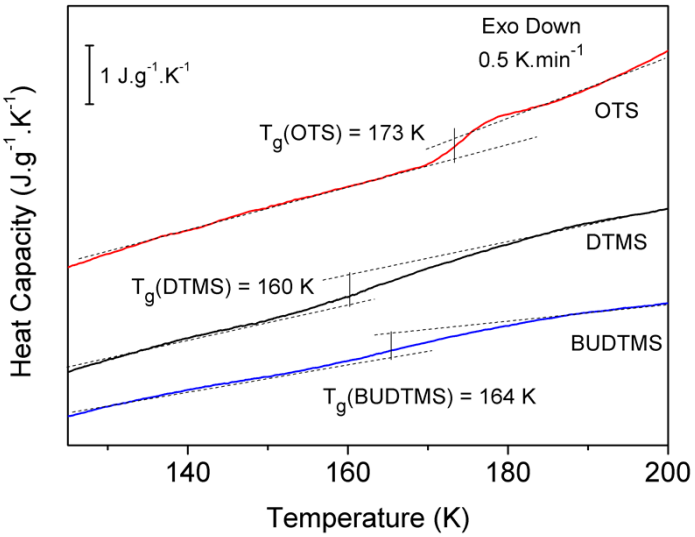

Figure SI-2. Temperature modulated - differential scanning calorimetry (TM-DSC) curves of (red) OTS, (black) DTMS, and (blue) BUDTMS monomers. Heat capacity steps corresponding to glass transitions are observed for each monomer. A rate of 0.5 $K.min^{-1}$, period of 60 s, and amplitude of 1 K were selected for heating.

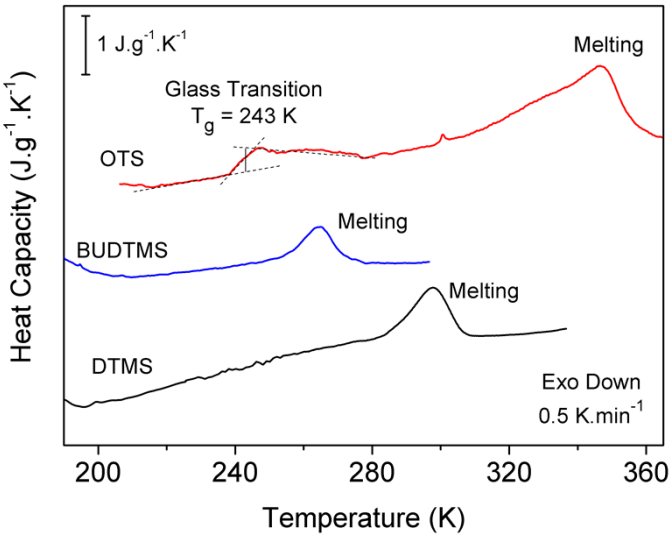

Figure SI-3. Temperature modulated - differential scanning calorimetry (TM-DSC) curves of (red) o-OTS, (black) o-DTMS, and (blue) o-BUDTMS. Endothermic peaks correspond to melting transitions of the crystalline phases. A heat capacity step corresponding to the glass transition of o-OTS is observed around 245 K. A rate of 0.5 $K.min^{-1}$, period of 60 s, and amplitude of 1 K were selected for heating.

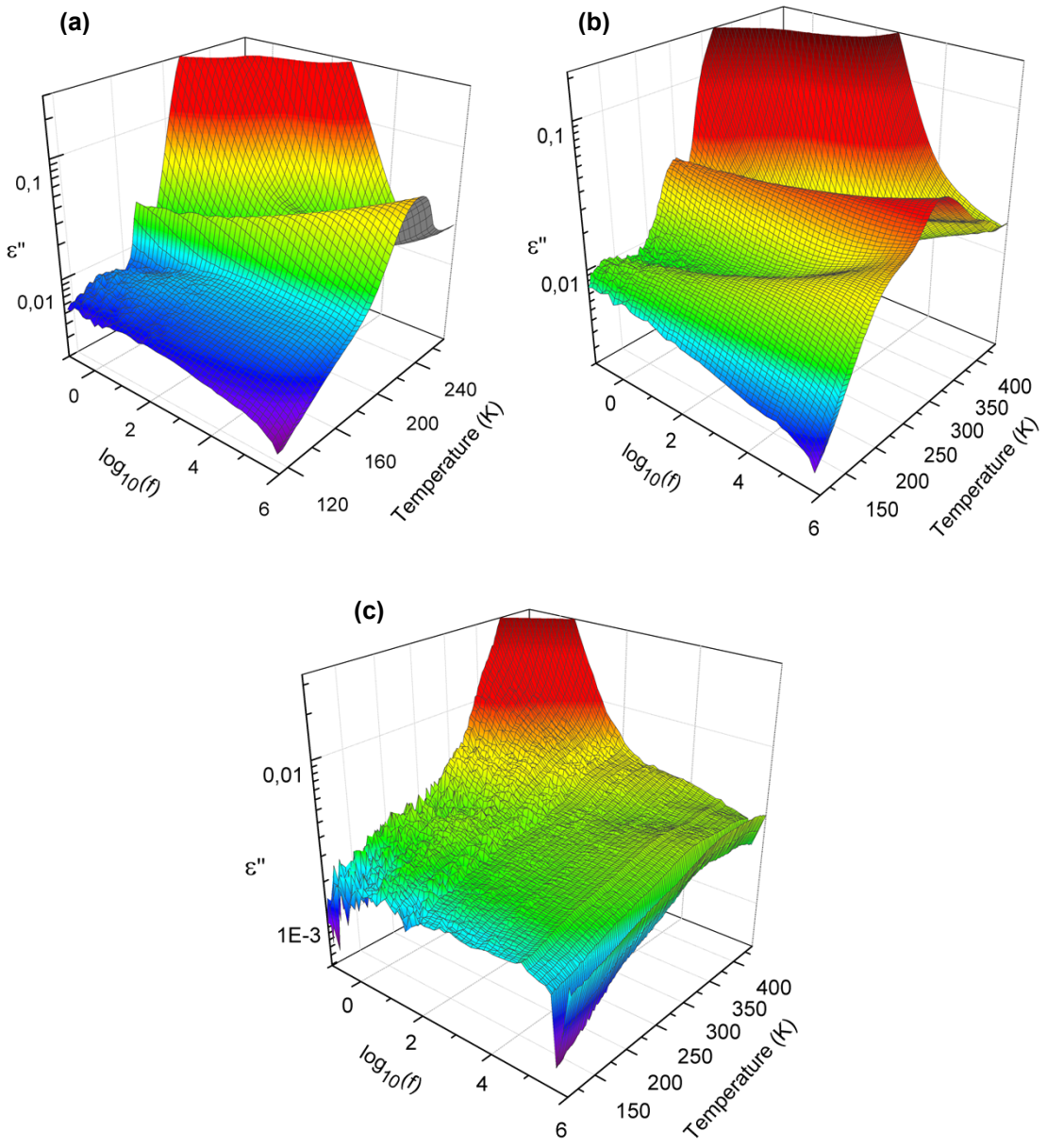

Figure SI-4. Dielectric loss (ε”) of OTS (a) monomers, (b) oligomers, and (c) self-assembled monolayers as a function of frequency and temperature.

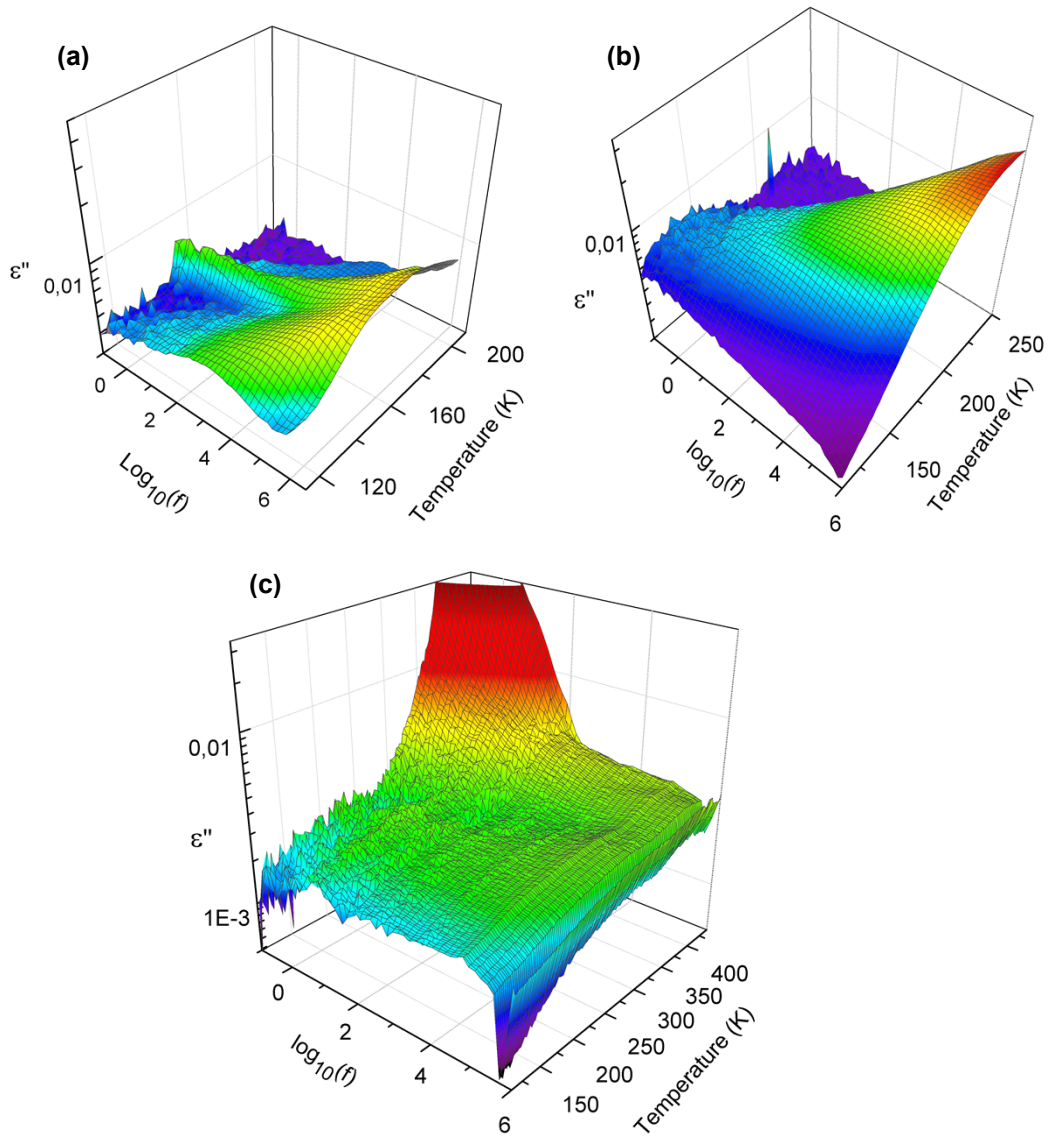

Figure SI-5. Dielectric loss (ε") of DTMS (a) monomers, (b) oligomers, and (c) self-assembled monolayers as a function of frequency and temperature.

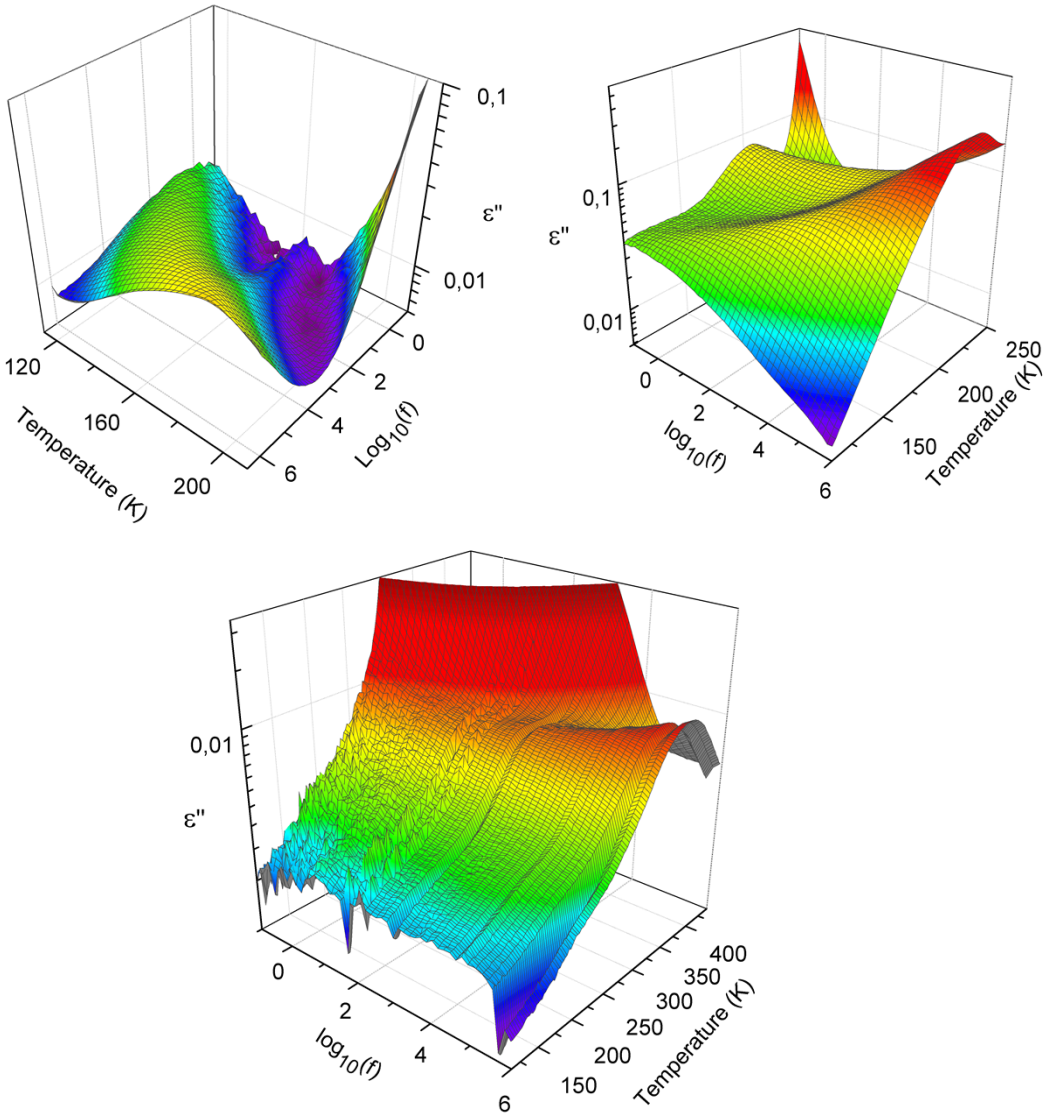

Figure SI-6. Dielectric loss (ε") of BUDTMS (a) monomers, (b) oligomers, and (c) self-assembled monolayers as a function of frequency and temperature.

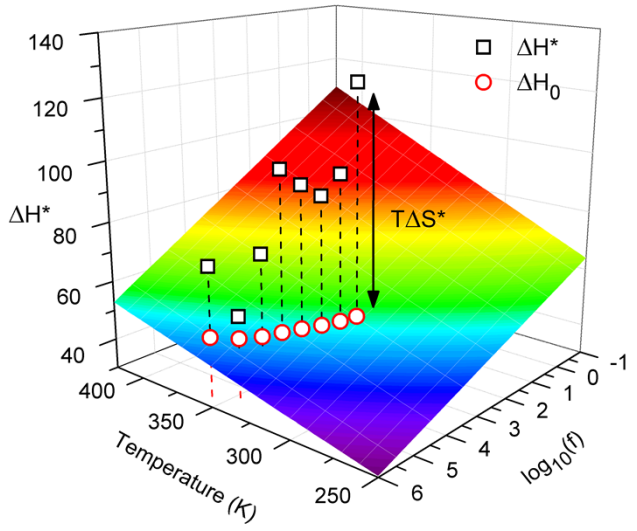

Figure SI-7. Variation of activation enthalpy and entropy values as a function of temperature and frequency. The color surface corresponds to the variation of the theoretical activation enthalpy ΔH_0 when $\Delta S^* = 0$. Black squares represent the experimental activation enthalpy ΔH^*, and red circles illustrate the contribution of ΔH_0 to ΔH^*. The difference between the experimental activation enthalpy ΔH^* and theoretical ΔH_0 corresponds to $T\Delta S^*$.