

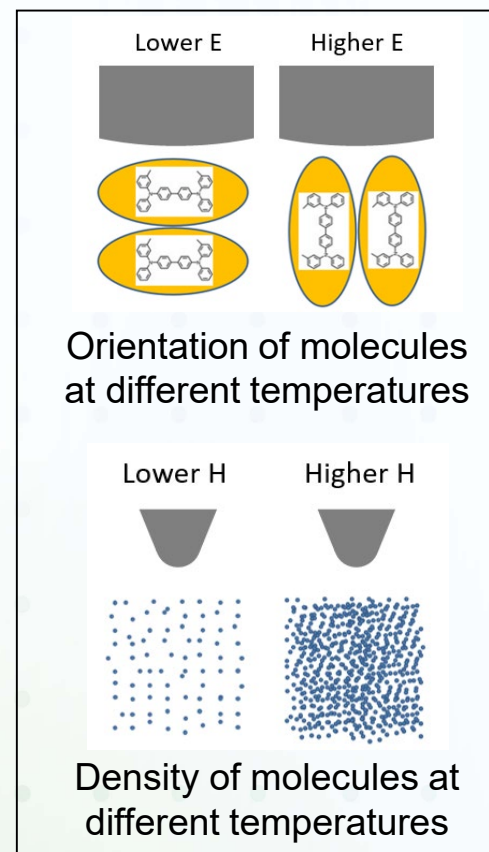
Mechanical Properties of Structure-Tunable Vapor-Deposited TPD Glass

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Creating glassy thin films of organic molecules at different temperatures changes both their stability in the glassy state – their density, and how hard they are to melt – and it changes how the molecules in the films are arranged – whether they tend to lie down flat on the surface or stand straight up.

Wisconsin MRSEC researchers have shown that these changes in stability and average molecular orientation also change the mechanical properties of the film, including how stiff it is and how hard it is. The molecules behave somewhat like a bundle of tiny sticks. A glass with the molecules lying down is less stiff than one with the molecules standing up, since pushing a bundle of sticks together sideways is easier than bending the sticks along their length. Similarly, a glass with the molecules tightly packed together at higher density together is harder than one with the molecules more loosely packed.

This research shows that control of stability and molecular orientation offers a new way to control the properties of protective coatings made from organic molecules like plastics.



Tangpatjaroen C, Bagchi K, Martínez R A, Grierson D, Szlufarska I., *Mechanical properties of structure-tunable, vapor-deposited TPD Glass*. The Journal of Physical Chemistry C 122 [48], pp 27775-27781, 2018.