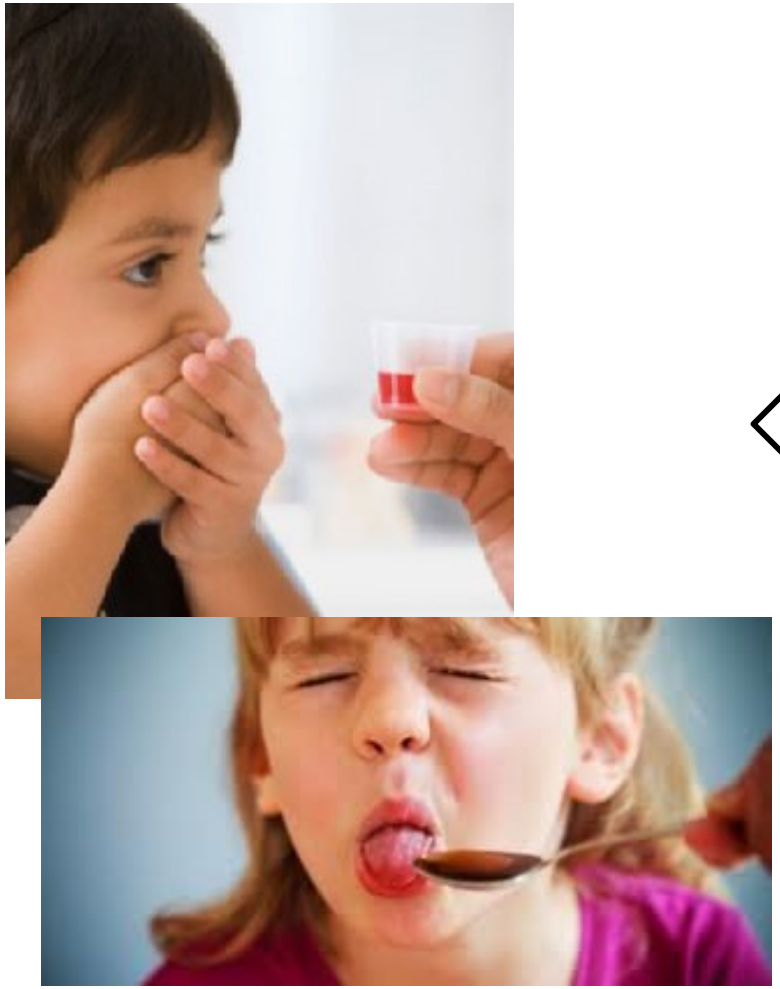
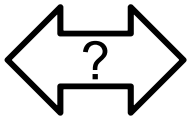
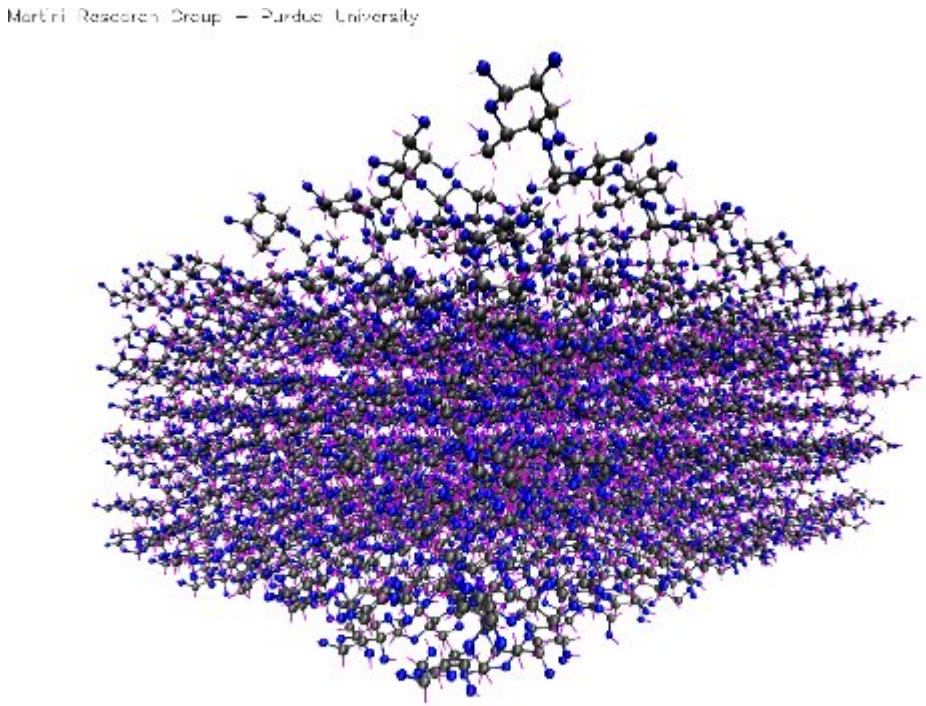
Nanoscale Tribology of Taste

Ashlie Martini

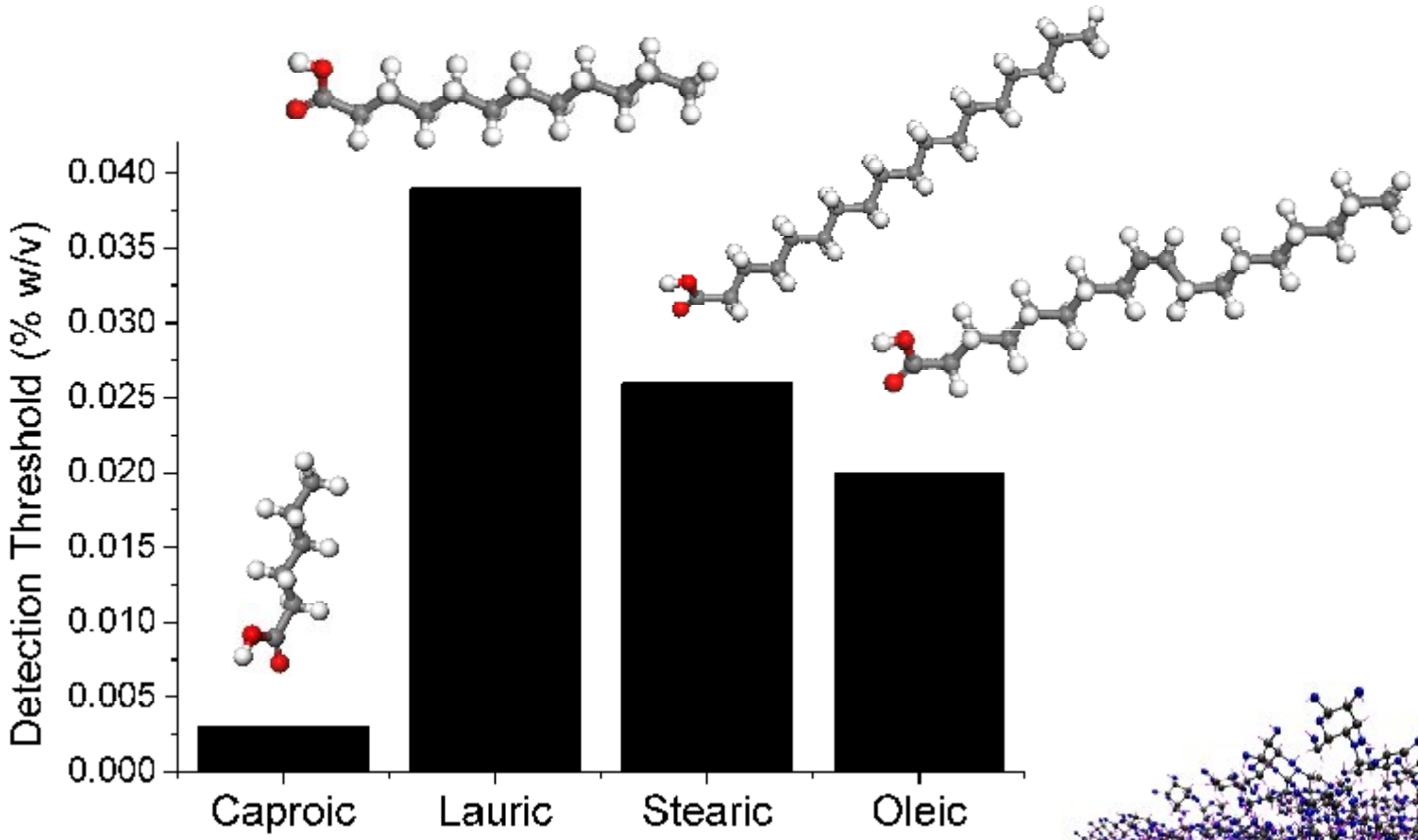
Concept and Approach



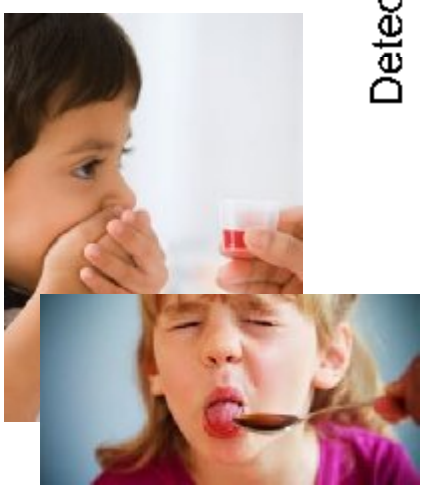


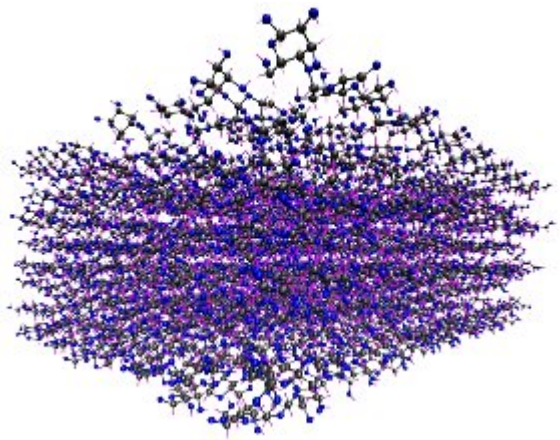


Concept and Approach

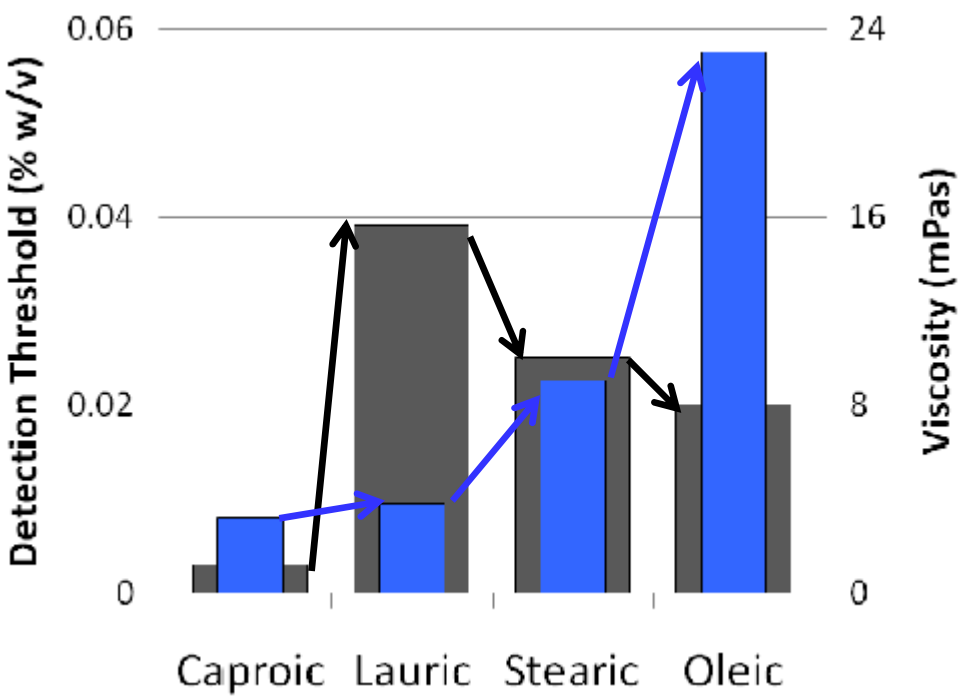


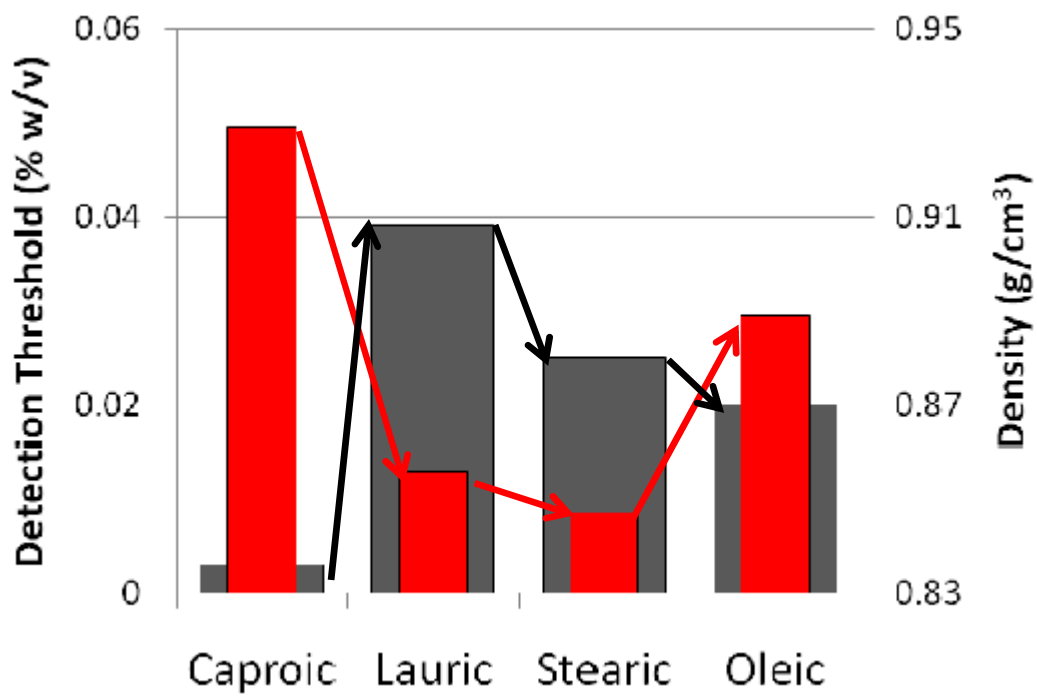
Mattes, Chemical Senses 34:145-150 (2009)
Chalé-Rush et. al. Chemical Senses 32:423-431 (2007)





Correlation to Bulk Properties





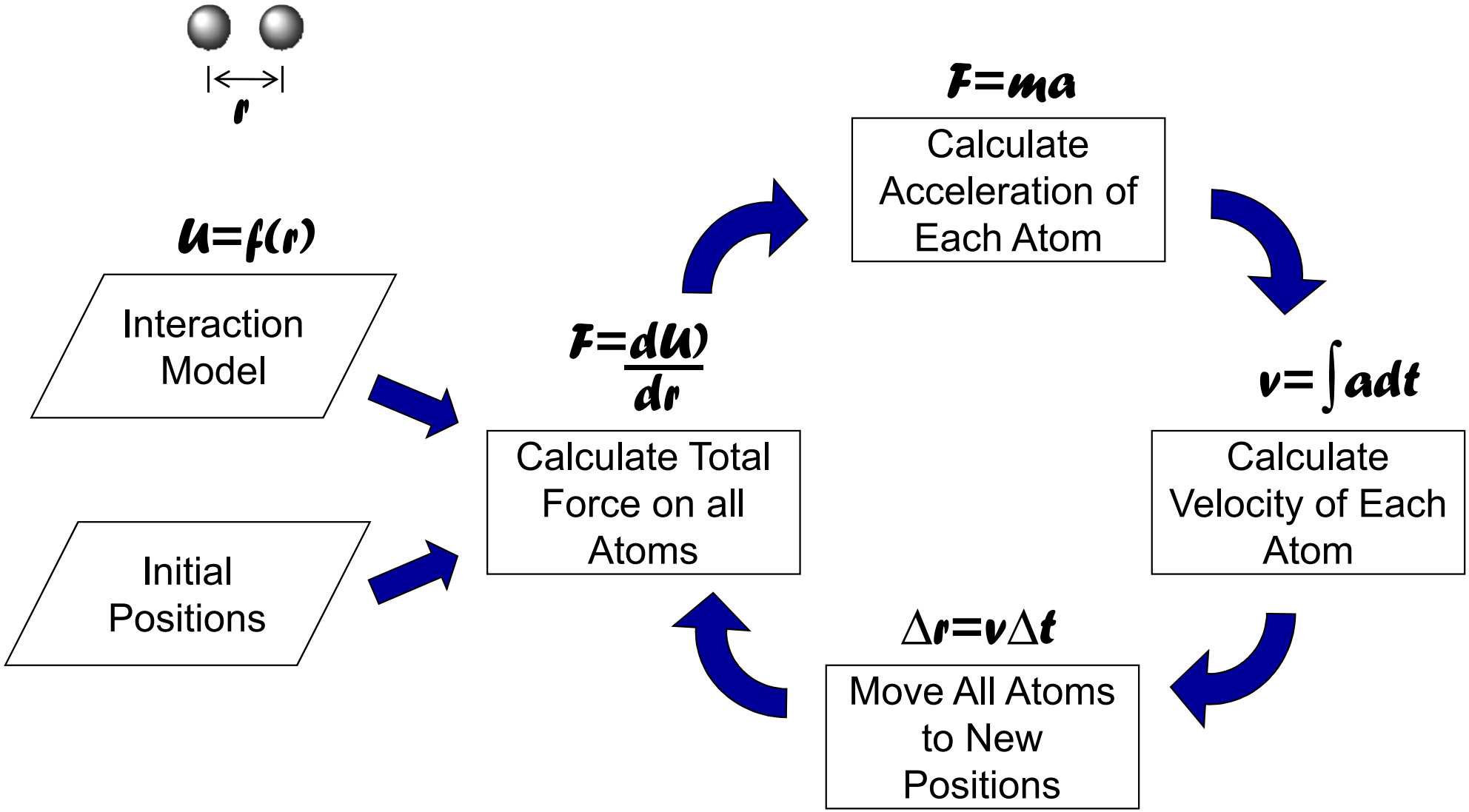
no significant correlation

Ultra Thin Films

"Rheology has been extended to the limits of thin films, where the bulk properties do not generally apply but which may better reflect the microscopic factors that ultimately influence sensory properties."

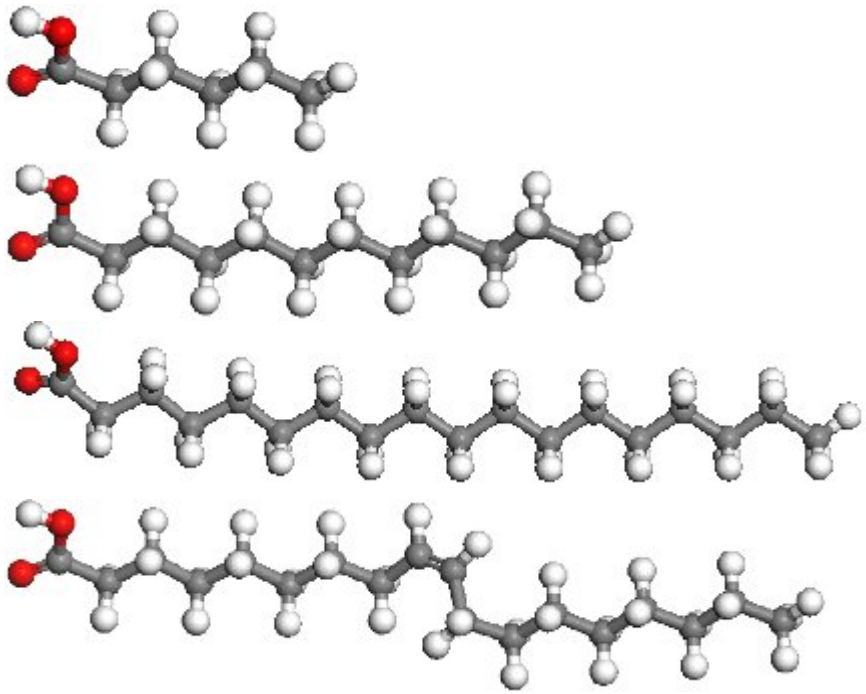
772—JOURNAL OF FOOD SCIENCE—Volume 62, No. 4, 1997

Molecular Dynamics Simulation

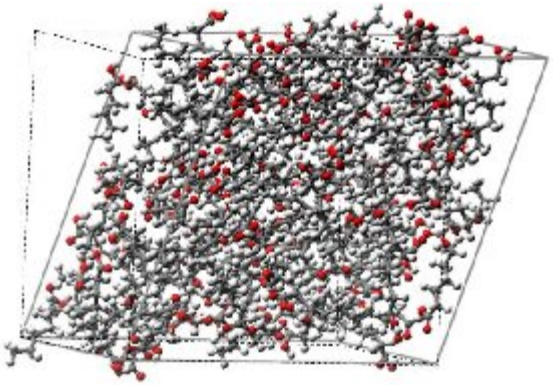


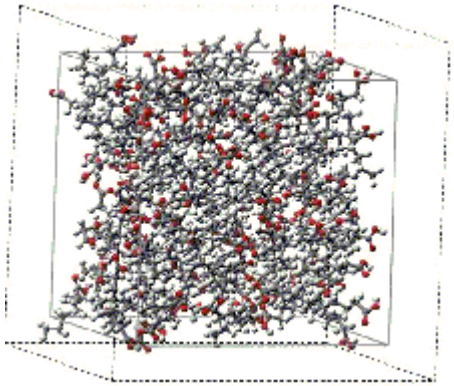
Molecular Dynamics Simulation

- Models
  - Caproic acid (6:0)
  - Lauric acid (12:0)
  - Stearic acid (18:0)
  - Oleic acid (18:1)

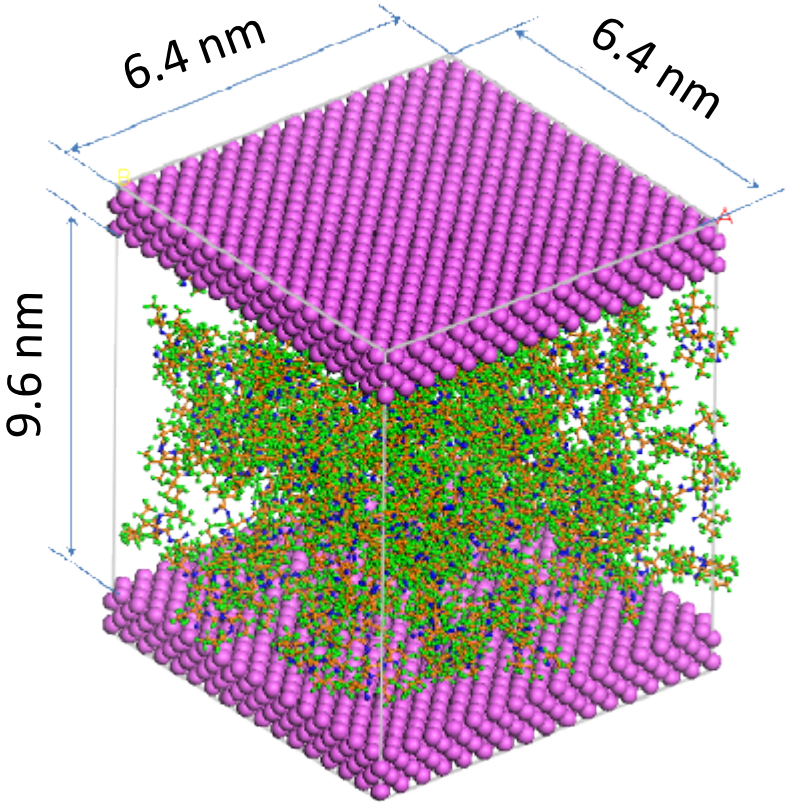


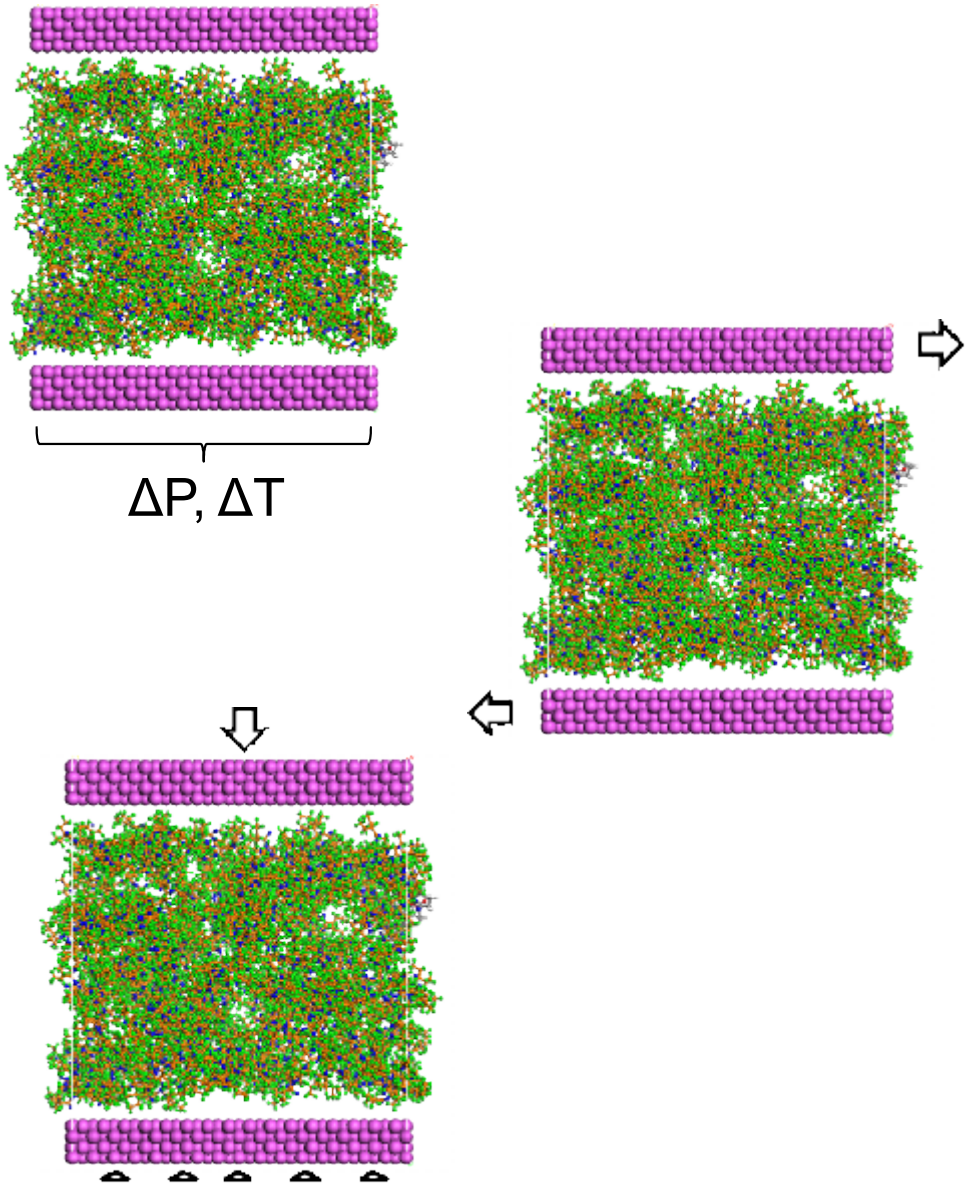
- Validation
  - Viscosity
  - Density



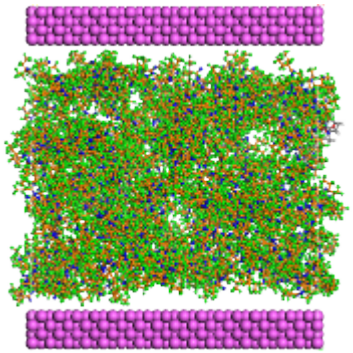


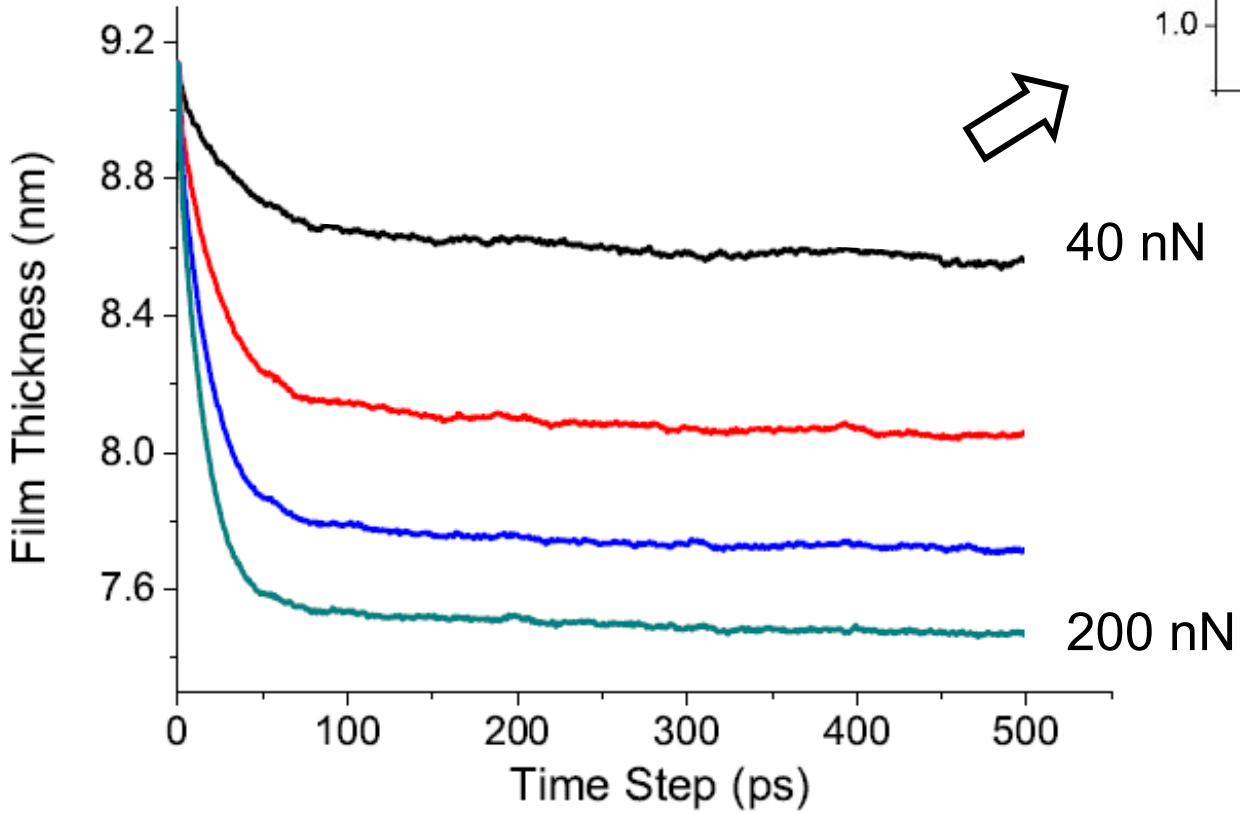
Thin Film Properties

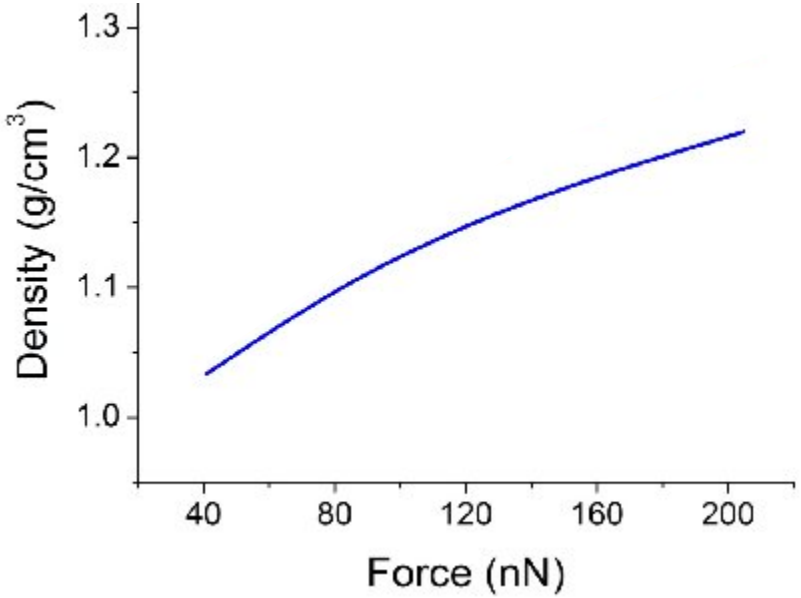


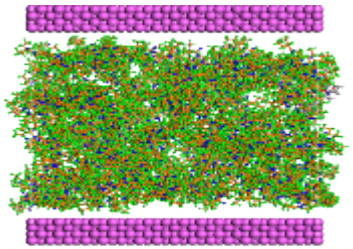


Compressibility









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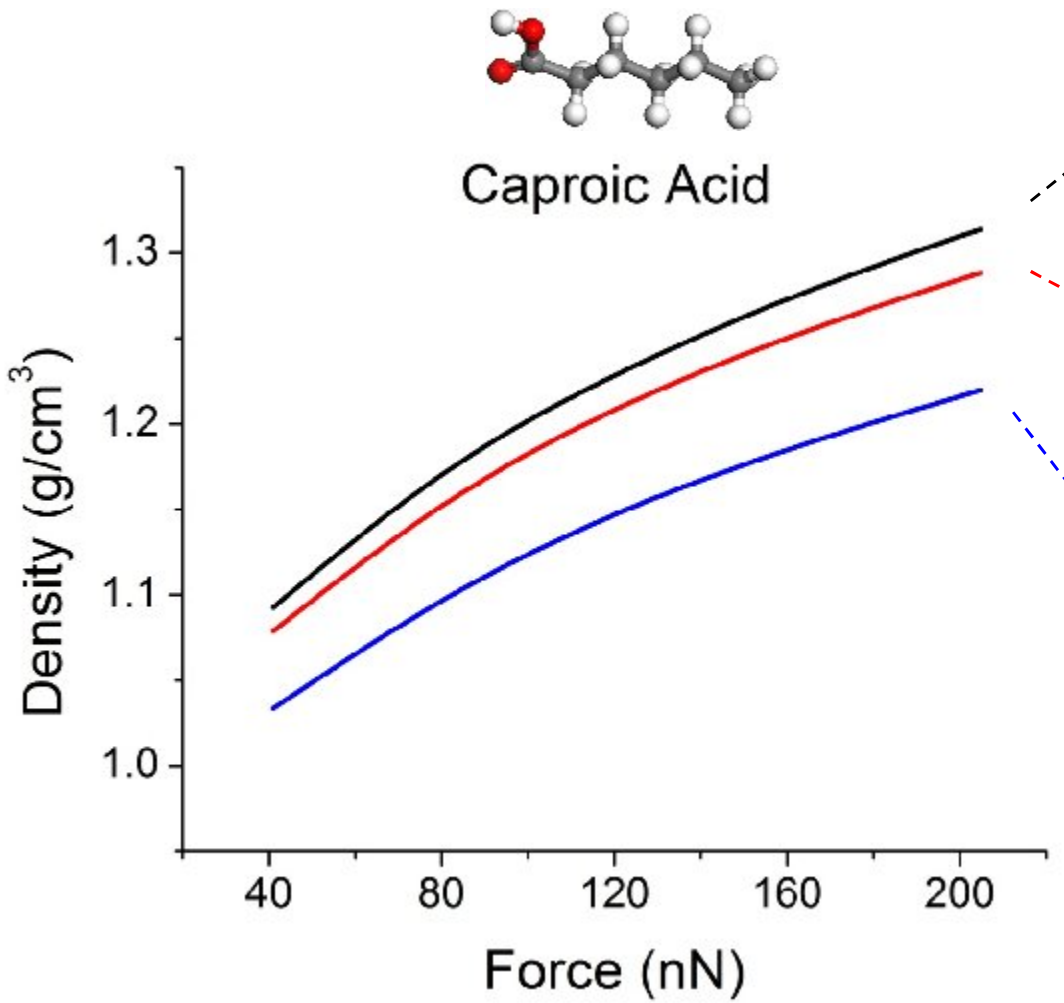

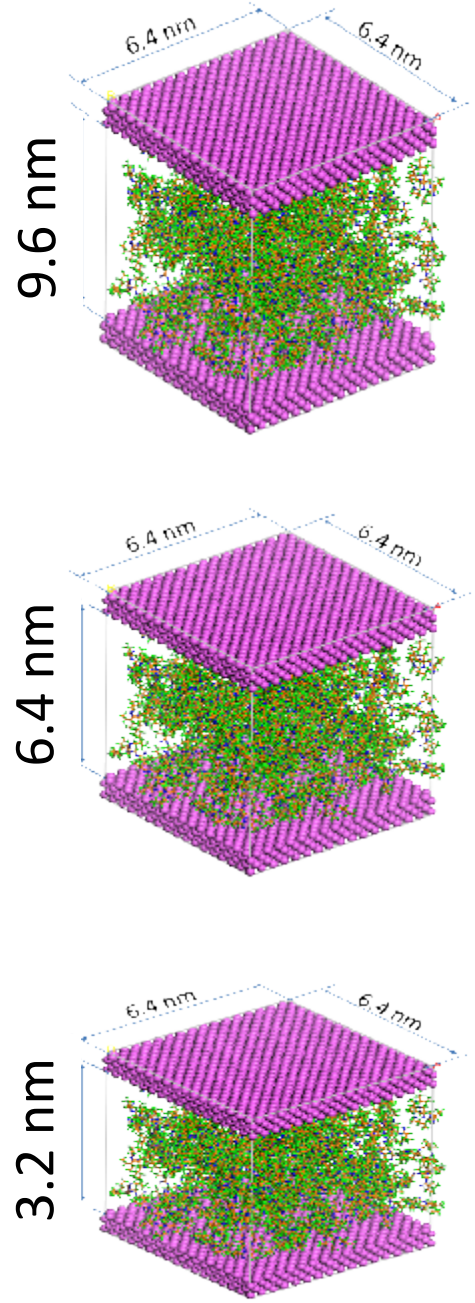

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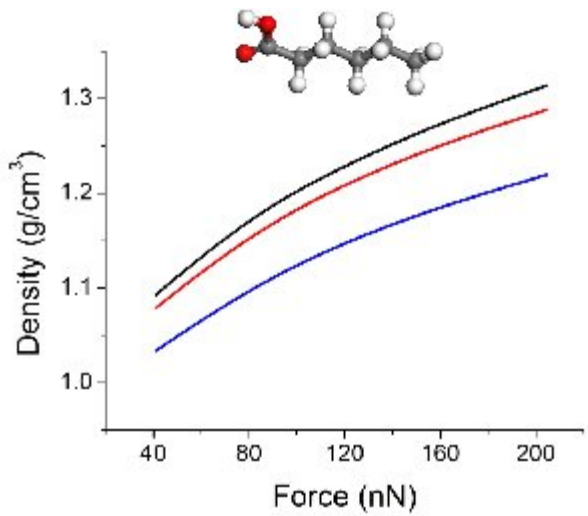

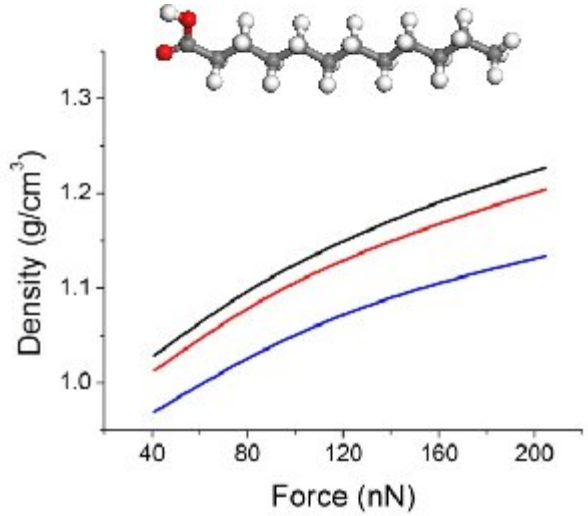

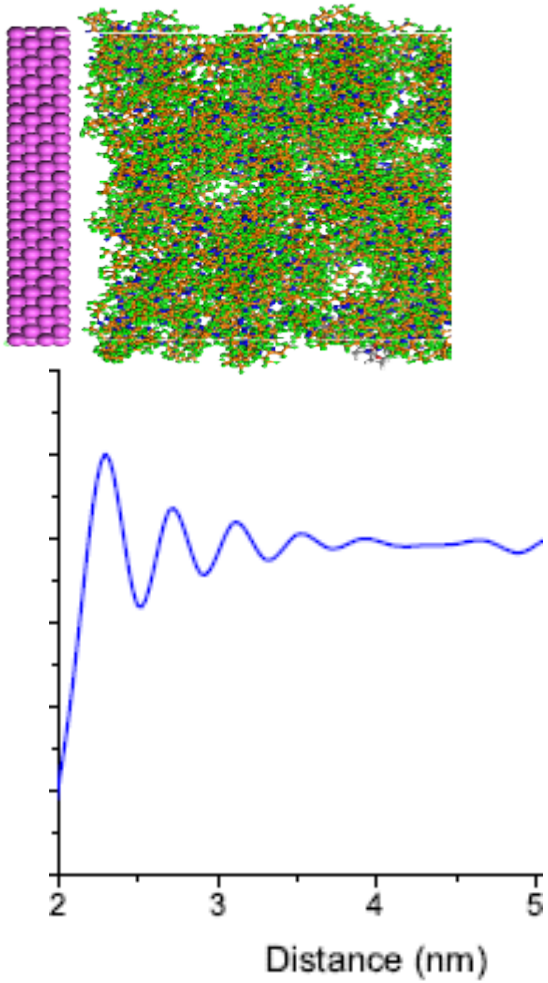

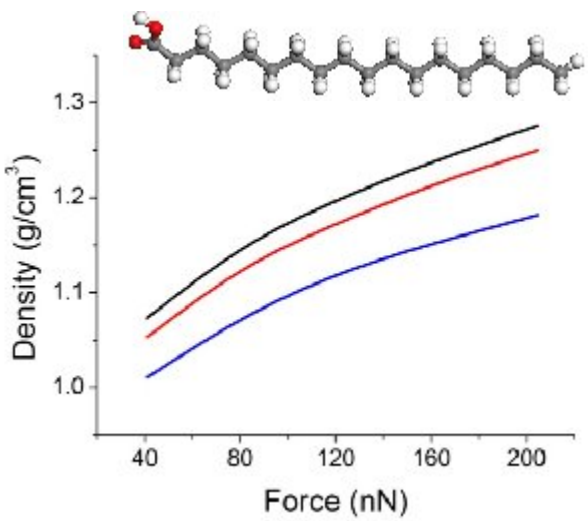

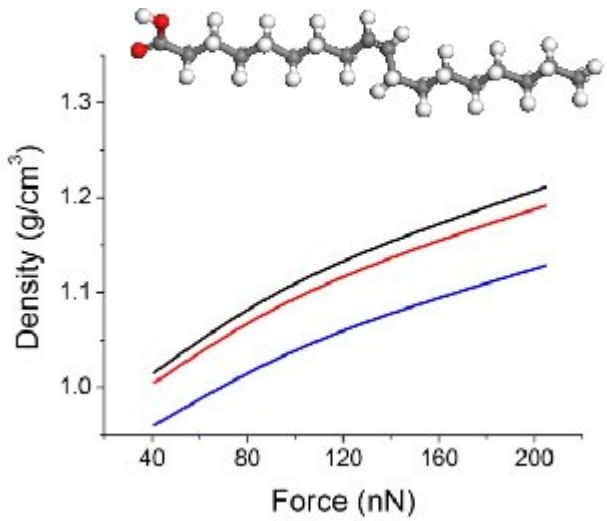

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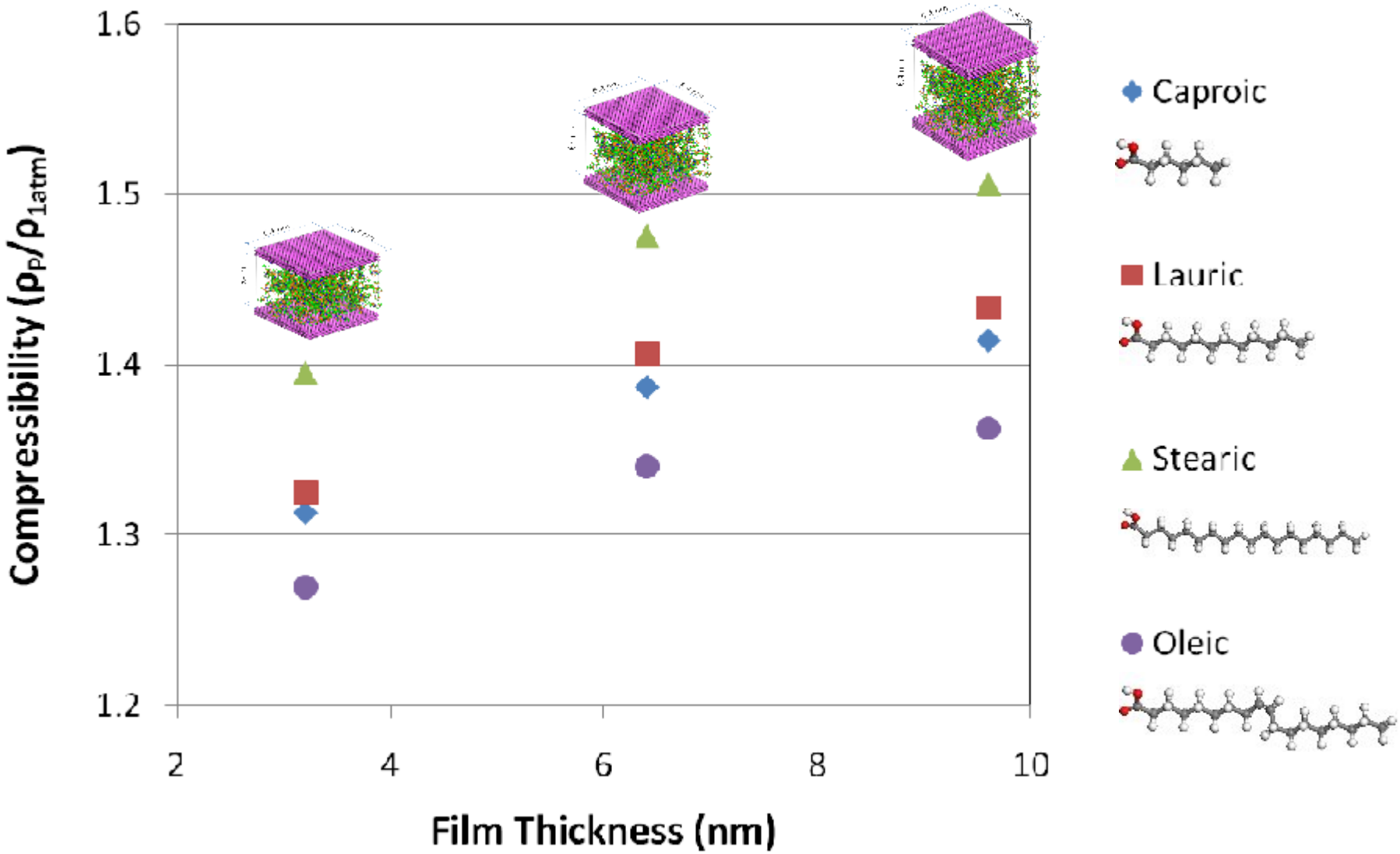
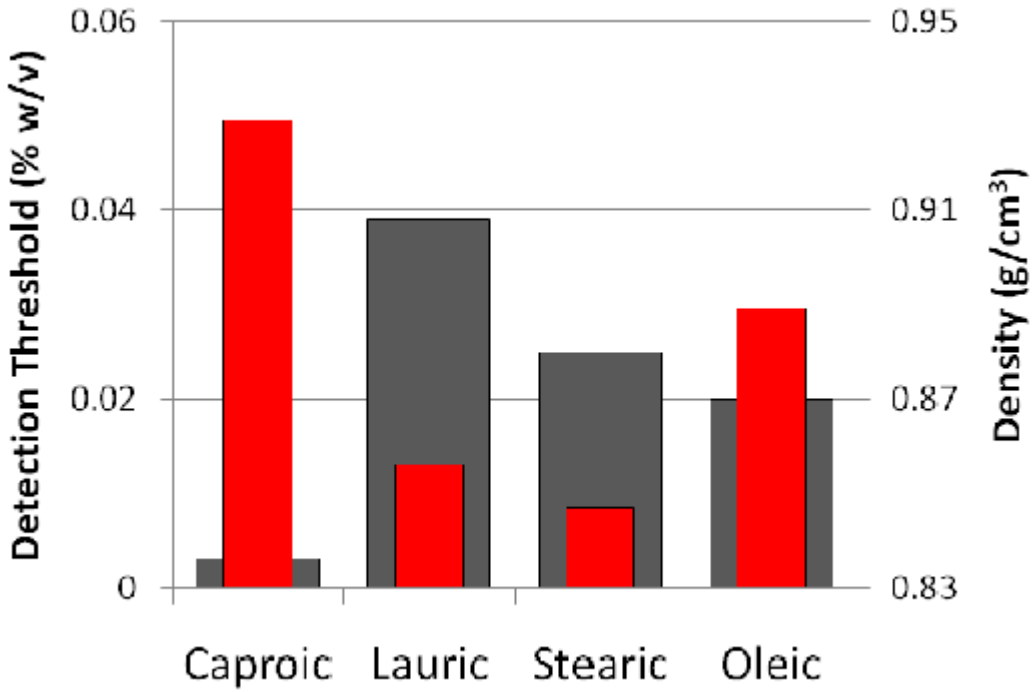
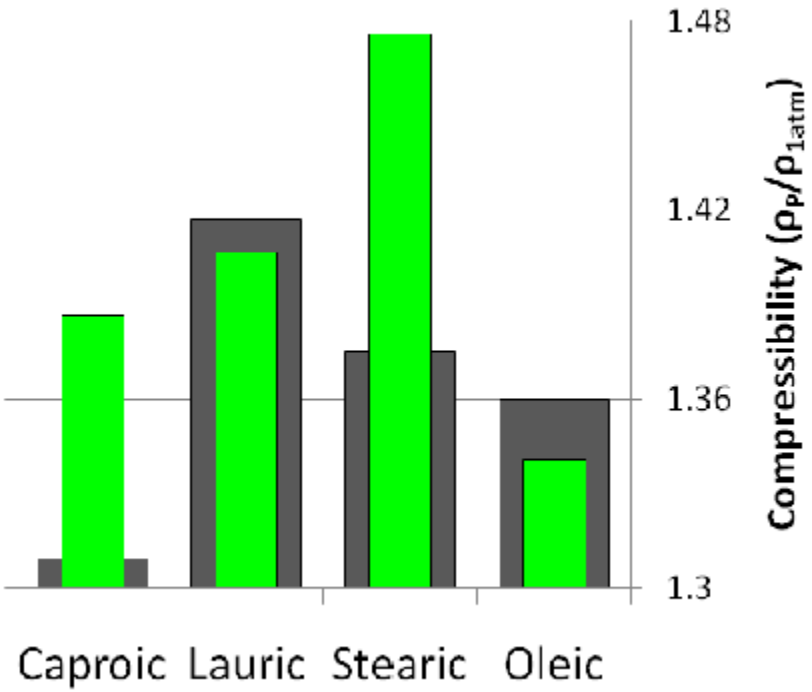


Correlation to Thin Film Properties



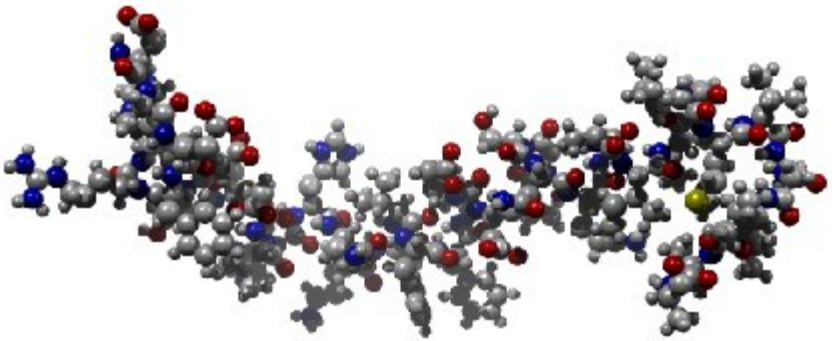


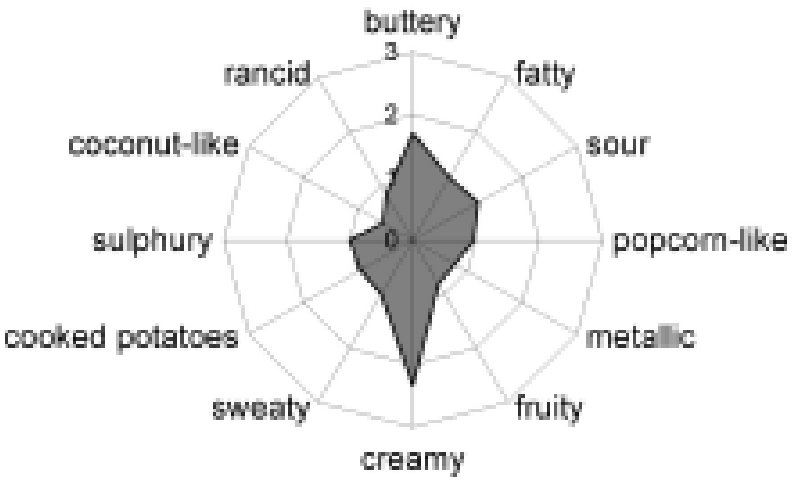
Chain length ⇧ ⟹ ⇩ ⇧

Un-saturation ⇧ ⟹ ⇧ ⇩

Future Research Opportunities

- Apply method to more complex molecules
- Predict additional properties
- Evaluate perceptions beyond detection
- Extend MD to other food related problems





J. Agric. Food Chem., Vol. 55, No. 23, 2007

Thank you for your time and attention!

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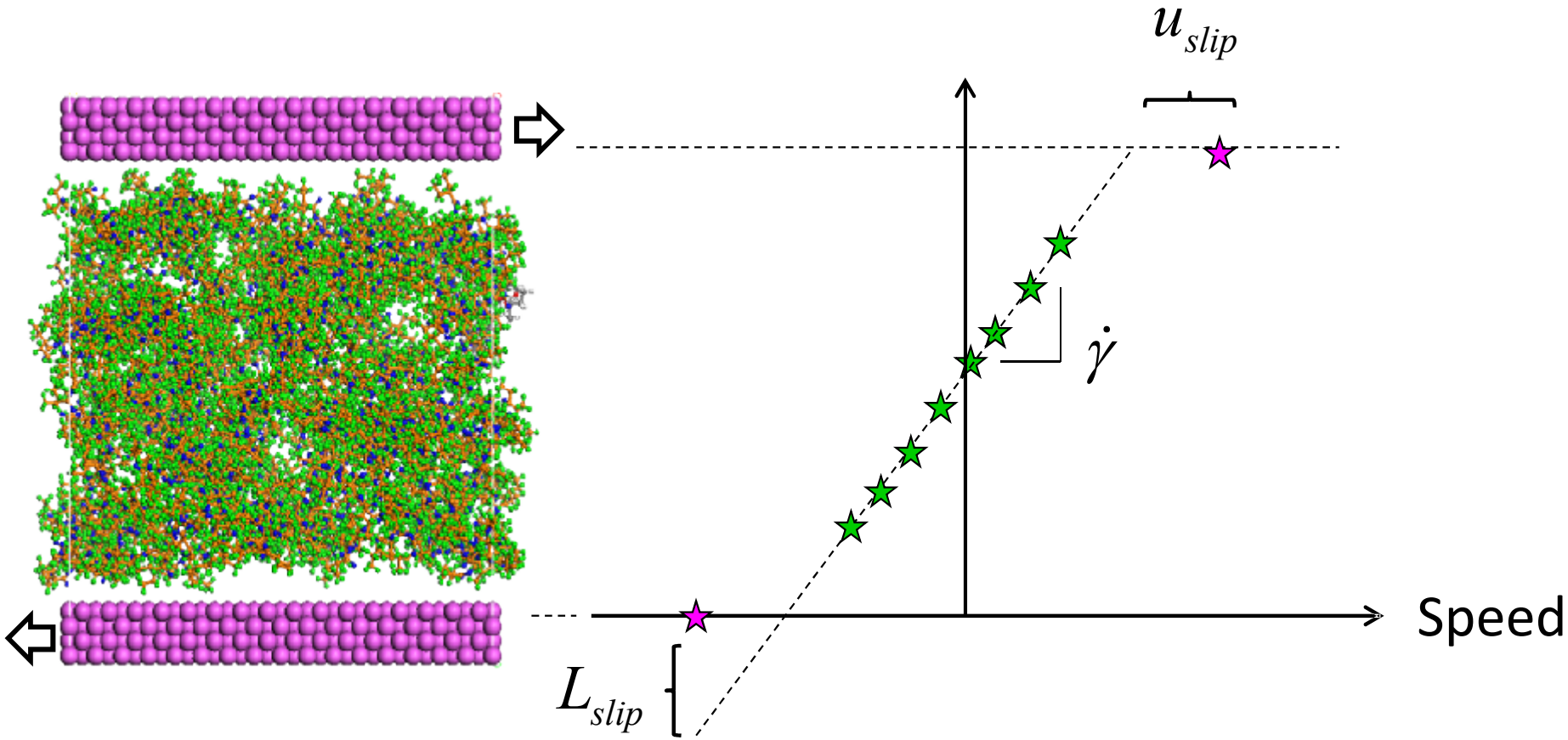
Interface Slip



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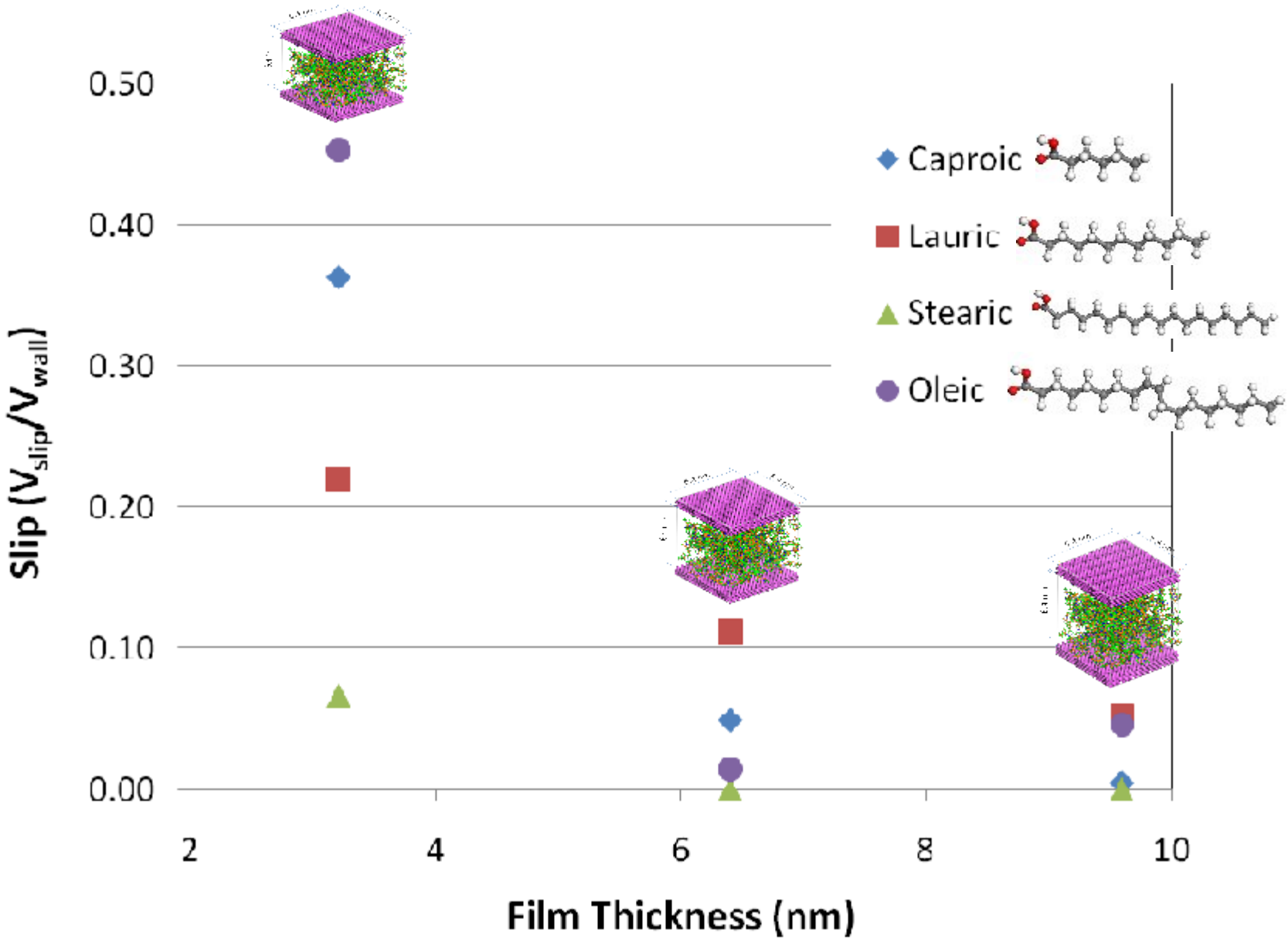

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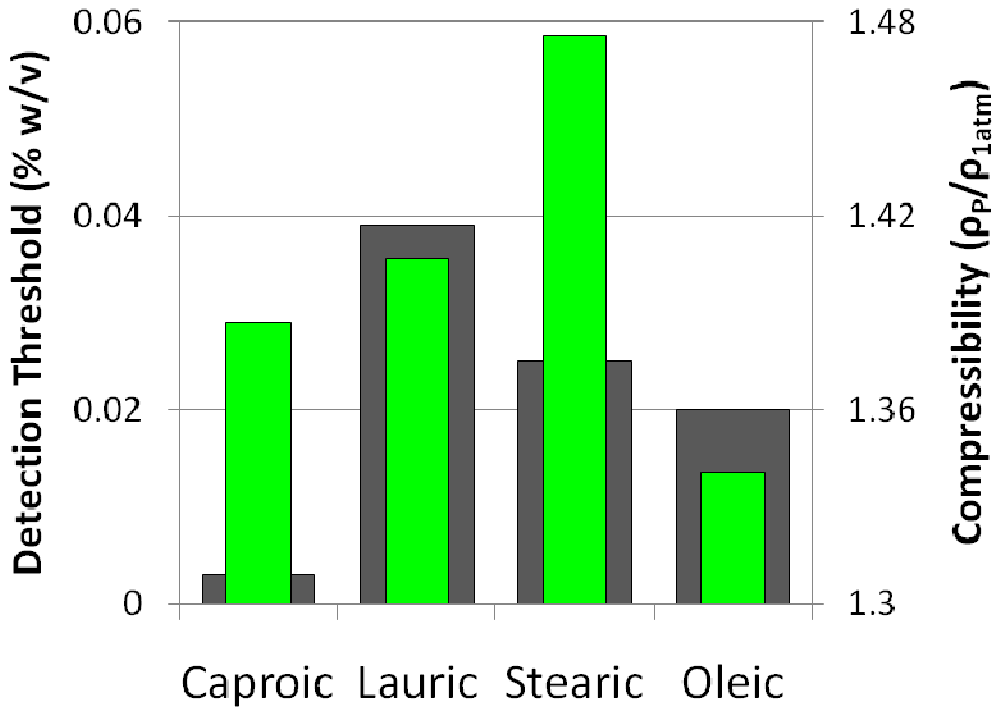

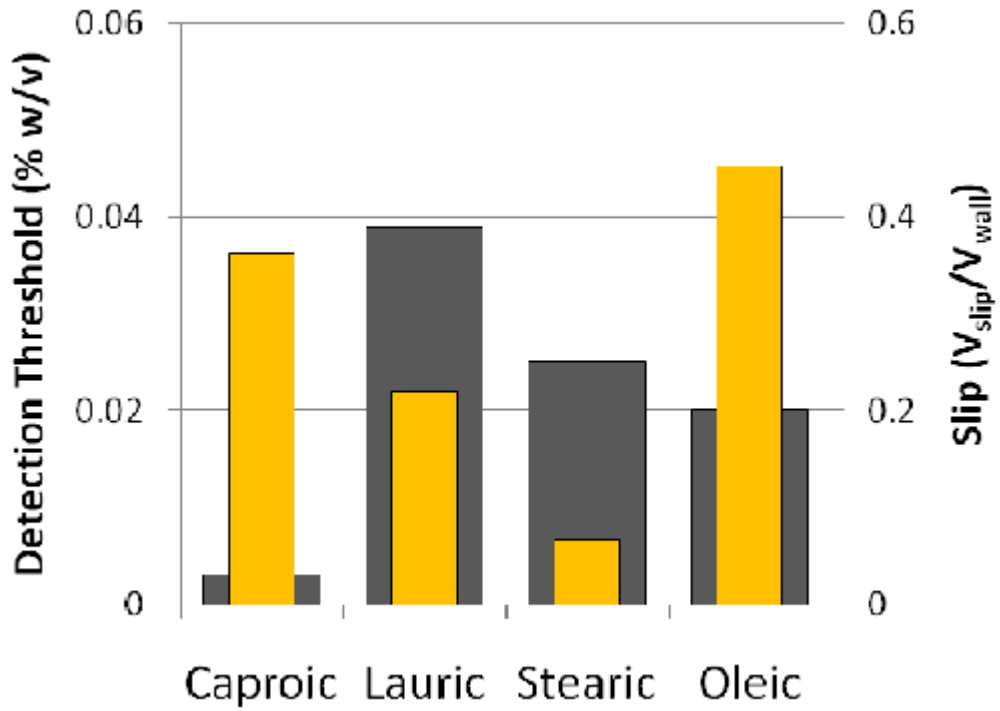

Chain length ⟹

Un-saturation ⟹