Soft Matter Physics and the Physics of Living Matter

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Configurations of liquid water molecules near hydrophobic cavities in molecular dynamics simulations. The blue and white particles represent the oxygen (O) and hydrogen (H) atoms, respectively, of the water molecules. The dashed lines indicate hydrogen bonds (that is, O-H•••O within 35° of being linear and O-to-O bonds of no more than 0.35 nm in length). The space-filling size of the hydrophobic (red) particle in a is similar to that of a methane molecule. The hydrophobic cluster in b contains 135 methane-like particles that are hexagonally close-packed to form a roughly spherical unit of radius larger than 1 nm.













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Basic question of SM physics

Why is living matter soft?

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Lesson from LC physics

Because it is made of large molecules (aggregates) whose strong atom-atom interactions (charges, valent bonds) are saturated within a molecule.

Intermolecular interactions are thus weaker and non-specific (dipole-dipole, dipole-induced dipole, double layer forces, dispersion forces, entropic forces, hydrophobic interactions, fluctuation forces, etc.)

Consequently, molecules are farther apart and only partially ordered. Theoretical description by point generalized dipoles is thus rendered possible.