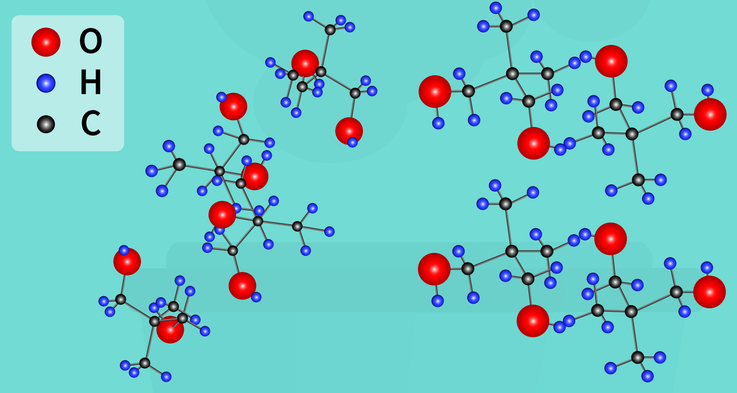
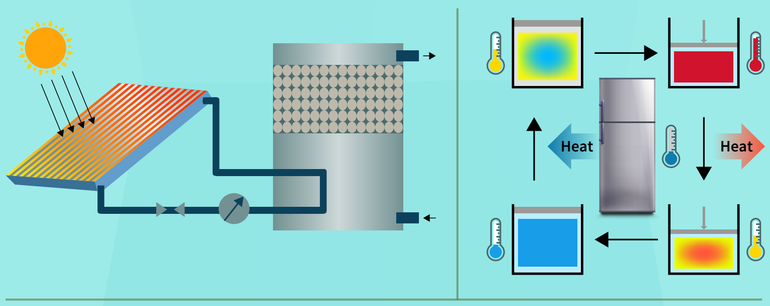
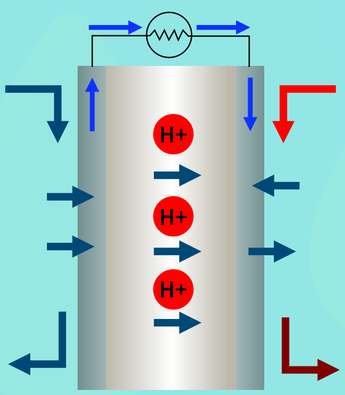
Different Phases and Properties of Neopentyl Glycol

RSC Advances

Neopentyl glycol (NPG) is an organic molecular plastic crystal that undergoes phase transition between ordered crystalline state and plastic crystalline state



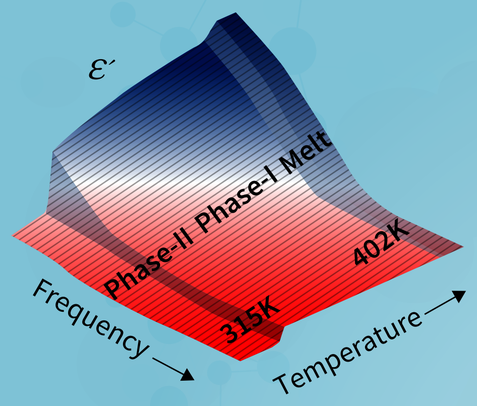




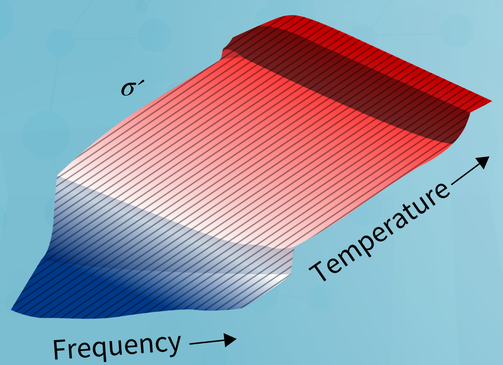
Owing to its unique physical properties, NPG is extensively used in the energy storage and manufacturing industry

The dielectric properties of different phases of NPG across wide temperatures remain unclear

Phase-dependent dielectric properties and proton conduction of NPG studied by variable-temperature broadband dielectric spectroscopy

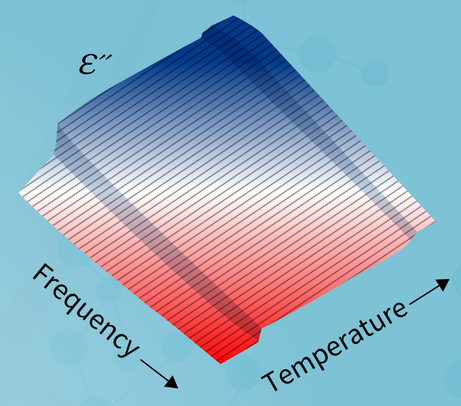


$$M^*(f) = 1/\varepsilon^*(f) = i2\pi f\varepsilon_0/\sigma^*(f)$$

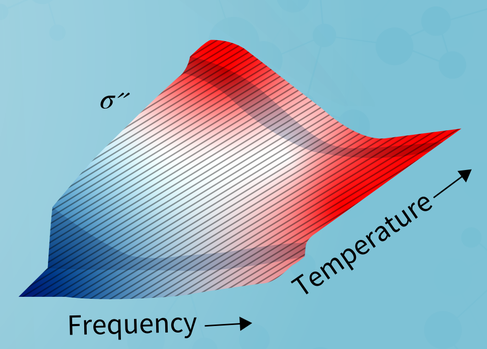


$$Z^*_s = \frac{U^*_s}{I^*_s}$$

$$\sigma^*(f) = \frac{\varepsilon_0}{C_0 Z^*(f)}$$



$$M^*(f) = i\omega C_0 Z^*(f)$$



Phase transformations of NPG across temperature range of 293–413 K

Phase-II —315 K→ Phase-I —402 K→ Melt

Ordered crystalline phase	Plastic crystalline phase	Molten phase
Proton conduction likely follows the proton hopping mechanism	Proton hopping mechanism is the probable ion-conducting mechanism	Proton conduction results from vehicle and Grotthuss mechanism

Elucidation of phase-dependent dielectric properties and proton conduction of NPG broadens the understanding of the behaviour of this valuable phase change material

Phase-dependent dielectric properties and proton conduction of neopentyl glycol
Luo et al. (2021) | RSC Advances | DOI: 10.1039/d1ra03366b

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