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Structure, ion transport and rheology of nanoparticle organic hybrids HAIBO QI, LYNDEN ARCHER, Cornell University — We report a new class of liquid nanoparticle organic hybrid materials (NOHMs), produced by tethering an organic oligomer corona to the surface of inorganic nanoparticles, and investigate their use as electrolytes. This talk focuses on the structure factor and transport properties of these materials. Specifically, because the suspending solvent is covalently tethered to the NOHMs cores, the structure factor is predicted to vanish in the limit of small q. This behavior arises fundamentally from the presence of a new entropic attraction force produced by the tethered solvent, which constrains separation of the nanoparticle cores. Additionally, we show that NOHMs based on lithium conducting corona provide high ionic conductivities and lithium transfer numbers when doped with lithium salts. The enhanced conductivity is investigated in detail by studying how the core particles affect the melting transition, rheology, and activation energy for ion transport in the corona.

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