We theoretically investigate non-linear and non-equilibrium phenomena in various soft materials and complex fluids, from glasses, colloids and granular systems to bacteria.

In recent years, we have primarily focused on the following problems:

1. The origin and role of spatial correlations of anomalous hydrodynamic transport in supercooled liquids
2. Non-Newtonian rheology of glassy and granular materials (shear-thinning, shear-thickening, fracture, etc.)
3. The effects of (near-field) hydrodynamic interactions on the collective dynamics of bacterial suspensions.