Designing Soluto-Inertial Suspension Interactions
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INTRODUCTION
The ability to tune colloidal interactions is crucial to the operation of products like shampoos, inks & paints.

SOLUTE-INERTIA
The duration of these interactions depends on how long the gradients in solution last. To have long lasting gradients, we use the concept of solute-inertia (SI).

Three ingredients for SI interactions: i) A chemical “beacon” (gray circle) that establishes and maintains gradient, ii) solute that mediates interaction, iii) particles (orange & green) that respond and migrate via DP

SI beacons may be made from materials that strongly partition solute

Scaling Analysis

RESULTS
SDS is known to associate with polyethylene glycol (PEG), motivating the use of PEG diacrylate (DA) hydrogel posts as SI beacons.

SI interactions between the PEG hydrogel beacons and the PS & decane particles are found to be oppositely directed, last for at least 1000 s and extend over 300 to 400 μm

Migration Velocity of PS Particles

CONCLUSIONS & FUTURE WORK
• Established a conceptual framework for designing long-range, long-lived, particle-surface specific SI interactions
• The generality & versatility is highlighted by combining the slow SI release of solute with DP migration [4,5]
• Such interactions will provide new routes for directing suspension behavior & synthesizing novel materials

Triggering Suspension Flocculation
SI "sources" and "sinks" give ability to incorporate strong local gradients & enable directed colloidal migration

REFERENCES

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