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APS March Meeting 2022

Monday–Friday, March 14–18, 2022; Chicago

Session S20: Active Matter in Complex Environments III

8:00 AM–11:00 AM, Thursday, March 17, 2022

Room: McCormick Place W-185BC

Sponsoring Units: DSOFT DBIO GSNP DFD

Chair: Dan Beller, UC Merced

Abstract: S20.00005 : Mixing of active and passive fluids in microtubule-kinesin active fluid system*

8:48 AM–9:00 AM

← Abstract →

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Fluid mixing is driven by the passive process of diffusion and the active process of stretching and folding, which homogenize the system's constituents. Conventionally, the active process is applied via external shearing machines such as a kitchen stand mixer. However, applying external shearing becomes more challenging in mesoscopic fluid systems due to the increasing difficulty of controlling the injection of energy on the micron scale. To overcome this challenge, we introduced microtubule-kinesin active fluid to power the active mixing process. To demonstrate its mixing capability, we created a multi-fluid system where active fluid is adjacent to an inactivated, passive fluid and allowed the active fluid to blend with the passive fluid until the system reaches a homogeneous state. We found that the mixing dynamics of such active-passive fluid mixing was dominated by the passive process of diffusion, until the activity of active fluid was tuned to be sufficiently high and the active processes of active fluid began to dominate the mixing process. Our work will stimulate the development of utilizing active fluid to accomplish mesoscale mixing tasks in multi-fluid systems at the micron scale.

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