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The mechanical properties of p-granule components LOUISE JAWERTH, Max-Planck Institute for the Physics of Complex Systems, SHAMBADITYA SAHA, Max Planck Institute of Molecular Cell Biology and Genetics, MARCUS JAHNEL, Max Planck Institue of Molecular Cell Biology and Genetics, FRANK JUELICHER, Max-Planck Institute for the Physics of Complex Systems, ANTHONY HYMAN, Max Planck Institue of Molecular Cell Biology and Genetics
— We study the major constituents of liquid droplets called "p-granules". During the one-cell stage of Caenorhabditis elegans development, these p-granules preferentially form on the posterior side of the cell and remain there preferentially as the cell divides leading to the majority of droplets remaining in one of the daughter cells. This process repeats during subsequent cell divisions with, again, the majority of droplets being maintained in one cell. When this process concludes and the worm continues to develop, the cell containing the p-granule droplets will eventually become the gonad of the adult worm. Previous work has suggested that the spatial segregation of p-granules that occurs at each stage is the result of a phase separation analogous to classic liquid-liquid demixing. We study this process under various buffer conditions in vitro by using a model system consisting of purified p-granule components. We find that these form liquid droplets under physiological conditions which resemble p-granules. We further report on the physical properties of these liquids and how they compare to their in vivo counterparts. In particular, we measure their surface tension and viscosity. We find surface tensions around 10-7 N/m and viscosities much higher than that of water.

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