Abstract Submitted
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Anomalous Diffusion of Water in Lamellar Membranes Formed by Pluronic Polymers[1] ZHE ZHANG, Biology and Soft-Matter Division, Oak Ridge National Laboratory; Julich Center for Neutron Science., MICHAEL OHL, Oak Ridge National Laboratory; Julich Center for Neutron Science., YOUNGKYU HAN, GREGORY SMITH, CHANGWOO DO, Biology and Soft-Matter Division, Oak Ridge National Laboratory, BIOLOGY AND SOFT-MATTER DIVISION, OAK RIDGE NATIONAL LABORATORY TEAM, JULICH CENTER FOR NEUTRON SCIENCE TEAM — Water diffusion is playing an important role in polymer systems. We calculated the water diffusion coefficient at different layers along z-direction which is perpendicular to the lamellar membrane formed by Pluronic block copolymers (L62: (EO_6-PO_{34}-EO_6)) with the molecular dynamics simulation trajectories. Water molecules at bulk layers are following the normal diffusion, while that at hydration layers formed by polyethylene oxide (PEO) and hydrophobic layers formed by polypropylene oxide (PPO) are following anomalous diffusion. We find that although the subdiffusive regimes at PEO layers and PPO layers are the same, which is the fractional Brownian motion, however, the dynamics are different, i.e. diffusion at the PEO layers is much faster than that at the PPO layers, and meanwhile it exhibits a normal diffusive approximation within a short time period which is governed by the localized free self-diffusion, but becomes subdiffusive after t >8 ps, which is governed by the viscoelastic medium.

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Zhe Zhang
Oak Ridge National Laboratory; Julich Center for Neutron Science.

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