

Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Transition dynamics from macro- to micro-phase separation in asymmetric lipid bilayers¹ SHUNSUKE SHIMOBAYASHI, MASATOSHI ICHIKAWA, Department of Physics, Kyoto University, TAKASHI TANIGUCHI, Department of Chemical Engineering, Kyoto University — In general, phase separation in binary liquid mixtures completes by relaxation below the transition temperature. The coarsening dynamics to complete phase separation have been extensively investigated in binary mixture systems. In contrast, the reverse dynamics from macro- to micro-phase separation remains poorly understood because no appropriate experiments and models exist for investigating this phenomenon. In this talk, we present the direct observations of morphological transitions from macro- to micro-phase separation using micrometer-sized asymmetric lipid vesicles exposed to externally added glycolipids (GM1:monosialotetrahexosylganglioside). The transition occurs via stripe morphology as a metastable state. During the transition, monodisperse micro domains emerge through repeated scission events of the stripe domains. Moreover, we numerically confirmed the transitions by the time-dependent Ginzburg-Landau model, which describes phase separation and bending elastic membrane. Numerical results suggest crucial roles of the local spontaneous curvature induced by the local asymmetric lipid composition.

¹This work was supported by Grant-in-Aid for JSPS Fellows Grant (No. 25-1270) and by KAKENHI (Nos. 26707020, 25103012, 26115709 and 15H03708).

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Date submitted: 04 Nov 2015

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