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Direct microscopic observation of localized protein bindings in topographically patterned lipid rafts TAE-YOUNG YOON, CHERLHYUNG JEONG, SIN-DOO LEE, Seoul National University, JOON HEON KIM, MYUNG CHUL CHOI, MAHN WON KIM, Dept.of Physics,KAIST — Signal transductions through binding of ligands to cell membrane receptors are the most fundamental way of cell-to-cell communications in multicellular organisms. Important classes of the cell membrane receptors are predominantly concentrated at the phase-separated domains of membranes, the lipid rafts. By localizing lipid rafts at predetermined sites on membranes, cells control the distribution of the ligand bindings to membrane receptors, thereby manipulating the position and intensity of the signal transductions. Thus, prescribed localization of lipid rafts in model membranes could become an important biomimetic methodology of studying cell-to-cell signaling and its engineering in laboratory environments. Here, we demonstrate that topographical nano structures incorporated in supported membranes control the organization processes of lipid rafts; formation, growth, and clustering, by generating elastic energy barriers. We made direct microscopic observations of localized protein bindings in topographically patterned lipid rafts that were prepared by micro-fabrication and nano-corrugation technologies. This topographical concept of controlling the distribution of ligand-membrane receptor binding processes, not disrupting the integral structure of lipid membranes, should provide a viable platform to study human diseases and drug delivery systems.

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