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Spontaneous Formation of Lipid Nanotubes and Lipid Nanofibers from Giant Charged Dendrimer Lipids ALEXANDRA ZIDOVSKA, KAI K. EWERT, CYRUS R. SAFINYA, Materials Department, University of California, Santa Barbara, JOEL QUISPE, BRIDGETT CARRAGHER, CLINTON S. POTTER, National Resource for Automated Molecular Microscopy, The Scripps Research Institute, La Jolla — Liposomes have attracted much scientific interest due to their applications in model cells studies and in drug encapsulation. We report on the discovery of new vesicle phases formed in mixtures of MVLBG2, DOPC and water. MVLBG2 is a newly synthesized highly charged (16+) lipid (K. Ewert et al., *JACS,* 2006) with giant dendrimer headgroup thus leading to a high spontaneous curvature of the molecule. In combination with zero-curvature DOPC, MVLBG2 exhibits a rich phase diagram showing novel vesicle morphologies such as bones, lipid nanotubes and nanofibers as revealed by differential contrast microscopy (DIC) and cryo-TEM. At the micron scale DIC reveals a new phase consisting of bone-like vesicles. This novel morphology persists down to the nanometer scale as shown by cryo-TEM. The nanotubes are of diameter 10-50 nm, length $> 1\mu$m and consist of a single lipid bilayer. A surprising new morphology arises resulting from a spontaneous topological transition from tubes to lipid nanorods. Funded by DOE DE-FG-02-06ER46314, NIH GM-59288, NSF DMR-0503347.

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