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Tuning Lyotropic Liquid Crystalline Phase Behavior of Gemini Surfactants by Linker Parity DOMINIC PERRONI, CARLOS BAEZ-COTTO, SRITEJA MANTHA, GREGORY SORENSON, ARUN YETHIRAJ, MAHESH MAHANTHAPPA, UW-Wisconsin-Madison — Aqueous bicontinuous lyotropic liquid crystals (LLCs) derived from small molecule surfactants are useful nanostructured materials with myriad applications, in fields ranging from structural biology to membrane science. However, access to these coveted phases is limited by the fact that few surfactant platforms readily stabilize these network phases over the wide amphiphile concentration and temperature phase windows necessary for their widespread applications. We have recently shown that gemini ("twin tail") dicarboxylate surfactants, comprising two single tail amphiphiles covalently linked near the headgroup by a hydrophobic bridge, exhibit a greatly increased propensity to form stable double gyroid LLC phases. In this presentation, we will demonstrate the unusual sensitivity of gemini dicarboxylate surfactant lyotropic self-assembly to the length of the hydrophobic bridge: odd-carbon linkers produce stable double gyroid phases over amphiphile composition windows as wide as 40 wt% that are stable between $T = 22$–100 °C. We rationalize these results in terms of the detailed molecular conformations of the surfactants that stem from the length of the bridging moiety, which suggests that this molecular design strategy may generally extend to other surfactant classes.

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