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Pseudo-phase Diagram of Cholesterol-Rich Filamentous, Helical Ribbon, and Crystal Microstructures Y.A. MIROSHNIKOVA, M. ELSENBECK, GUANQING OU, Y.V. ZASTAVKER, Olin College, K. KASHURI, G.S. IANNACCHIONE, WPI — Optical and calorimetric techniques are employed to study temperature and concentration dependence of three self-assembled microstructure types formed in Chemically Defined Lipid Concentrate (CDLC): filaments, helical ribbons, and crystals. CDLC consists of cholesterol, bilayer-forming amphiphiles, and micelle-forming amphiphiles in water, and is considered to be a model system for cholesterol crystallization in gallbladder bile. Phase contrast and DIC microscopy indicate the presence of all three microstructure types in all samples studied. Optically observed structural evolution indicates that filaments first bend to form helical ribbons followed by clustering and "straightening" of these structures into short and increasingly thickening filaments that dissolve with increasing temperature. Complementary calorimetric studies (differential-scanning and modulation) reveal thermal signatures that correspond to this observed structural evolution, which occurs throughout a large region of metastable chemical coexistence. These results suggest that a pseudo-phase diagram for the microstructures formed in CDLC may be developed to explain the observed behavior of the system.

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