The strongly anisotropic Cahn-Hilliard model is considered. In particular, a highly nonlinear anisotropic surface energy makes the PDE system very challenging at both the analytic and numerical levels. In this talk, a convexity analysis is performed to the surface energy potential, and a careful estimate reveals that all its second order functional derivatives stay uniformly bounded by a global constant. In turn, a linear approximation becomes available for the surface energy part, and a detailed estimate demonstrates the corresponding energy stability. Its combination with the implicit treatment of the nonlinear double well potential terms yields a weakly nonlinear, energy stable scheme for the whole system. Moreover, with a careful application of the global bound for the second order functional derivatives, an optimal rate convergence analysis becomes available, which is the first such result in this area. Some numerical simulation results are also presented in the talk.