The Cahn–Hilliard system

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In their 1958 paper, J. W. Cahn and J. E. Hilliard showed that the energy of a isotropic non-uniform system can be written as

$$\int [f(\varrho) + \frac{1}{2}k|\nabla \varrho|^2]dV \tag{1}$$

where $f(\varrho)$ is the energy of a uniform system with density ϱ.

This result assumes that the reciprocal of the composition gradient is much larger than the typical intramolecular distance.

The Cahn-Hilliard system

$$\begin{aligned} \dot{c} &= \operatorname{div}(M\nabla\mu) \\ \mu &= \psi'(c) - k\Delta c \end{aligned} \tag{2}$$

was introduced by J. W. Cahn and

to model phase separation and coarsening.