**Figure 3-9** **Nucleation energy.** To achieve crystallization, nucleation must overcome the kinetic barrier that exists for phase separation (crystallization) from the metastable solution. At its critical size, it is equally likely for the nucleus (symbolized by the aggregate at the peak of the red curve) to fall apart again (left red arrow) or to continue growing into a crystal (right red arrow). Once a nucleus above a critical size defined by the critical free energy of nucleation is formed, additional gain of binding enthalpy overcomes entropic loss during crystal growth, and the system can proceed towards its 2-phase equilibrium state (right side of image). The free energy of nucleation Δ*Gn* (red curve, scaled up by a factor of 10 for clarity) as a function of critical nucleus radius *r* is the sum of two competing terms - a volume-dependent (-v*r*3) term lowering Δ*Gn* and a surface-dependent (s*r*2) term increasing Δ*Gn* (Sidebar 3-6).