Homogeneous nucleation

$$E = 4/3\ \pi\ r^3\ G_v + 4\ \pi\ r^2\ \boldsymbol{\sigma}$$

G_v is negative and $\boldsymbol{\sigma}$ is positive

The critical radius is the value of r at the maximum of the energy curve

$$dE/dr = 0 = 4\pi r^2\ G_v + 8\pi r\ \boldsymbol{\sigma}$$

$$r_c = -2\ \boldsymbol{\sigma}/G_v$$