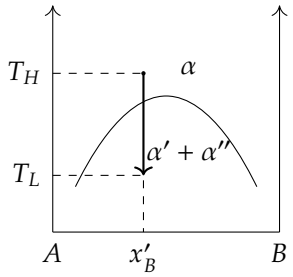
Spinodal Decomposition

Consider a binary alloy system with a miscibility gap, i.e.,

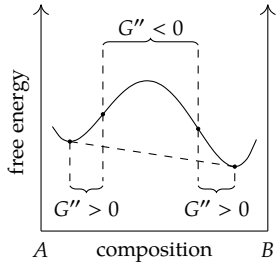


now, consider a transformation which must occur when an alloy with composition x'_B is quenched from temperature T_H to a lower temperature $T_L{}'$, i.e.,

$$\alpha \longrightarrow \alpha' + \alpha''.$$

In order to properly deal with the transformation, we need to analyze, not surprisingly, the G_{sol} vs composition relation at the transformation temperature T_L!

I.e.,



In particular,

1. If x'_B inside the $G'' < 0$ region, then small fluctuations in composition $\Rightarrow$ $G \downarrow$ about x'_B. $\therefore$ system is unstable and decomposition continues via "uphill" diffusion!