Department of Materials Science and Engineering
Massachusetts Institute of Technology
3.14 Physical Metallurgy – Fall 2003

Problem Set #6

Due Wednesday, November 5, 2003

6.1 As we briefly discussed in class, three common precipitation-strengthened aluminum systems are Al-Zn, Al-Cu, and Al-Ag.

What parameters control the degree of strengthening in these systems? If you had to choose one of the three systems to get the highest strength possible, which would you choose, and why?

6.2 Following on from 6.1: What parameters control the stability of these systems against coarsening? On this basis, which system would you choose and why?

6.3 The precipitation sequence in many alloys proceeds first through GP zones, then to a metastable phase such as θ''. Considering the structural differences between GP zones and θ'', identify two reasons why θ'' are more beneficial for strengthening as compared with GP zones.