Department of Materials Science and Engineering
Massachusetts Institute of Technology
3.14/3.40 Physical Metallurgy – Fall 2009

Review Assignment #3

Due Wednesday, December 9, 2009

Four recent research articles have been made available on the course website:

Group A: Experimentally-oriented articles:

1. Krug et al., "Core–shell nanoscale precipitates in Al–0.06 at.% Sc microalloyed with Tb, Ho, Tm or Lu", Acta Materialia, v58 p134, 2010

2. Adachi et al., "Computer-aided three-dimensional visualization of twisted cementite lamellae in eutectoid steel", Acta Materialia, v67, p5995, 2008

Group B: Simulation-oriented articles:

3. Perez et al., "Implementation of classical nucleation and growth theories for precipitation", Acta Materialia, v56, p2119, 2008

4. Terentyev et al., "Strengthening due to coherent Cr precipitates in Fe–Cr alloys: Atomistic simulations and theoretical models", Acta Materialia, v56, p3229, 2008

3.14 students: Select one article from the above four, submit one document

3.40 students: Select one article from each of the two groups, A & B, submit two documents

After selecting an article, read it carefully, and think critically about what you have read. You will then prepare a short review of the article, in about 2 pages. About the first third of your review should be a synopsis of the paper, inclusive of methods and main results. The remainder of the review should ***offer a critique*** of the paper, and present some creative thoughts for future questions to be addressed. For example, some things to discuss may include:

• Does anything in this paper contradict the "textbook" knowledge that you are learning in class?
• Alternatively, does this paper significantly add to our understanding of something to the point where we should add this new knowledge to our textbook?
• Are the methods used in the work sufficient to support the conclusions drawn by the authors?
• Is the logic internally consistent? Do all of the data support the same conclusion?
• Can you suggest a better way to resolve one or more of the open questions in this work?
• Is there a simple experiment that can either refute or substantially support the authors' claims?
• How general are the conclusions of this paper; are these results to be expected for other metals or materials?
• What doors does this work open for future research?
• What doors does this work open for industrial development or usage of metals?

3.40J / 22.71J / 3.14 Physical Metallurgy

Fall 2009